

# **Final Report**

# Indoor Air Human Health Risk Assessment

Nyanza Chemical Waste Dump Superfund Site Operable Unit II, Ashland, Massachusetts

#### Prepared for:

U.S. Army Corps of Engineers New England District 696 Virginia Road Concord, Massachusetts 01742-2751

October 25, 2005



ICF Consulting 33 Hayden Avenue Lexington, MA 02421 USA ICF Contract DACW33-00-D-0002 ICF Reference Number 032044.0.011

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#### **List of Acronyms**

ADD Average daily dose

ATSDR Agency for Toxic Substance and Disease Registry

BW Body weight

CERCLA Comprehensive Environmental Response, Compensation, and

Liability Act

COPC Chemicals of potential concern

CSF Cancer slope factor
CSM Conceptual site model
CTE Central Tendency Exposure

DCB Dichlorobenzenes
DCE 1,1-Dichloroethene

DNAPL Dense non-aqueous phase liquid

ED Exposure duration EF Exposure frequency

EPA U.S. Environmental Protection Agency
ESD Explanation of Significant Difference
GW-1 Ground Water-1 standard (from MCP)
GW-2 Ground Water-2 standard (from MCP)
HEAST Health Effects Assessment Summary Tables

HHRA Human health risk assessment

HI Hazard index
HQ Hazard quotient
ICF ICF Consulting
IR Inhalation Rate

IRIS Integrated Risk Information System

IUR Inhalation Unit Risk

MADEP Massachusetts Department of Environmental Protection

MCP Massachusetts Contingency Plan

μg/L Micrograms per liter

μg/m<sup>3</sup> Micrograms per cubic meter mg/m<sup>3</sup> Milligrams per cubic meter MRL Minimal Risk Level (MRL)

NAE U.S. Army Corps of Engineers - New England District

NPL National Priorities List

OU Operable Unit

Pa Pascals

ppb/v Parts per billion by volume

PPRTVs Provisional Peer Reviewed Toxicity Values

QAPP Quality Assurance Project Plan

RfC Reference concentration

RfD Reference dose

RI Remedial Investigation

RME Reasonable maximum exposure

ROD Record of Decision

### Nyanza Task Order DACW33-00-D-0002 Nyanza Indoor Air HHRA Final Report October 2005

SVOCs Semi-volatile organic compounds

TCB 1,2,4-Trichlorobenzene

TCE Trichloroethene

TGC Target Ground Water Concentration

UR Unit risk

URF Unit risk factor

USACE U.S. Army Corps of Engineers VOCs Volatile organic compounds

#### 1.0 Introduction

This Report presents the approach to and results of an indoor air human health risk assessment (HHRA) at the Nyanza Chemical Waste Dump Superfund Site (Nyanza Site) Operable Unit (OU) II. This work was conducted under ICF Consulting's Contract (DACW33-00-D-0002) with the U.S. Army Corps of Engineers (USACE) - New England District (NAE), and was conducted in accordance with the approved Final Work Plan, dated April 28, 2005.

#### 1.1 Project Objectives

The objective of the indoor air HHRA at the Nyanza Site is to evaluate the potential risks to individuals who may be exposed to indoor air at residential and commercial/industrial/municipal facilities located above the Nyanza ground water plume. The indoor air HHRA will support the U.S. Environmental Protection Agency's (EPA's) determination of the most appropriate remedial option that will protect human health.

EPA Region I tasked the USACE NAE to assist in the remedial investigations and remedy evaluation at the Nyanza Site. The overall objective of the project is to determine if any modification to the remedy presented in the 1991 Record of Decision (ROD) for OU II is warranted, based on many years of subsequent data collection including ground water, dense non-aqueous phase liquid (DNAPL), and indoor air. This review includes a three step process of data collection, risk assessment, and remedy evaluation and/or modification.

#### 1.2 Project Overview

This indoor air HHRA was conducted within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or "Superfund") and followed applicable EPA guidelines for completing a human health risk assessment. The technical approach to performing the indoor air HHRA includes:

- Review and Compilation of Available Data, including:
  - o Data Compilation and Review
  - o Building Characteristics
- Indoor Air HHRA, including:
  - o Tier 1 Primary Screening
  - o Tier 2 Secondary Screening
  - o Tier 3 Site-Specific Assessment Inhalation

This HHRA quantifies indoor air inhalation risks using two data sets: available indoor air data collected by EPA and site-wide ground water data collected by ICF Consulting (ICF).

- Available indoor air data collected by EPA for several residences and municipal buildings are used to quantify the potential indoor air inhalation risks at these specific locations. EPA has determined that the data are useable for this HHRA.
- Site-wide ground water data collected by ICF are used to conduct vapor intrusion modeling (using the EPA-recommended vapor intrusion model) to estimate indoor air concentrations and potential indoor air inhalation risks for representative ("typical") residences and industrial/commercial facilities above the Nyanza ground water plume.

The estimated site-wide risks (based on ground water data), along with the estimated building-specific risks (based on measured indoor air data), are used to support a decision on further remedial actions at the Site.

#### 1.3 Site Description

The Nyanza Site is located on Megunko Road in Ashland, Massachusetts, approximately 22 miles west of Boston. From 1917 to 1978, the Site was used to produce textile dyes, intermediates, and other products. The Site was formerly the location of Nyanza, Inc., which operated from 1965 to 1978 before its bankruptcy in 1978. Before 1965, various chemical manufacturing intermediates were located at this Site. The Site was listed on the EPA National Priorities List (NPL) in 1983, and is comprised of three distinct areas: (1) the 35-acre former Nyanza. Inc. property (Property) which consists of the wetlands, the Megunko Hill area, and the industrial area along Megunko Road; (2) drainage ways between the Property and the Sudbury River, consisting of the Eastern Wetland, Trolley Brook, Outfall Creek, and the Lower Raceway; and (3) a 33-mile stretch of the Sudbury River down to its confluence with the Assabet River in Concord.

Due to the complexity of contamination discovered at the Nyanza Site, EPA divided cleanup activities into four OUs. OU I includes the former Nyanza Inc. Property and several adjacent upland and wetland areas where soils and sludges were contaminated with heavy metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). OU II includes a ground water plume of organic contamination that extends from the former Nyanza Inc. Property in a north/northeasterly direction toward the Sudbury River. OU II includes migration of ground water, direct contact with ground water, inhalation of vapors from ground water, and discharges of ground water to surface water. OU III includes the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway (former locations of mercury-contaminated sediments). These drainageways are located between the former Nyanza Inc. Property and the Sudbury River and are referred to as the Continuing Source Areas because they previously acted as continuing sources of mercury contamination to the Sudbury River. OU IV includes a 33-mile stretch of the Sudbury River where sediment and fish are contaminated with mercury.

The Megunko Hill Area was owned and utilized by a dye manufacturing facility for the surface and sub-surface disposal of chemical sludges, process wastes, and debris. Sludges containing high concentrations of heavy metals, aromatic amines, and VOCs eventually migrated to wetlands below. The low-lying industrial area was also used for the disposal of heavy metal sludges and organic solvents into active lagoons and/or underground vaults. The Western Wetland, also known as the Area C Wetland, was found to contain disposed wastewater treatment sludge and contaminated sediment from runoff originating at Megunko Hill. The Trolley Brook Wetland, also know as Area G Wetland, received septic waste effluent from settling lagoons and runoff from Megunko Hill. As a result of these operations, contamination migrated from the Nyanza Property into ground water and to drainage ways between the Property and the Sudbury River. Ground water flow in both the overburden and bedrock is in a north-northeast direction, from Megunko Hill toward the Sudbury River. The area overlying the ground water plume consists of a mixture of residential, commercial, industrial, and municipal buildings.

A number of VOCs, SVOCs, and metals (including mercury) have been detected in the overburden and bedrock ground water at the Site. The most common VOCs include chlorobenzene, total 1,2-dichloroethene (DCE), and trichloroethene (TCE). The principal SVOCs include 1,2,4-trichlorobenzene (TCB), dichlorobenzenes (DCB), aniline, naphthalene, and nitrobenzene. The principal metals include antimony, beryllium, cadmium, iron, lead, manganese, mercury, nickel, sodium, and thallium. DNAPL has also been observed in wells at the Site, specifically those located near Worcester Air Conditioning.

Several past remediation and restoration activities have occurred at the Nyanza Site, including:

- 1987 to 1988: the excavation of an underground storage vault containing 12,025 tons of material; 300 tons of contaminated soils were incinerated, and an additional 356 tons of soils were excavated and disposed of at an approved offsite facility.
- 1990 to 1992: capping areas of existing lagoons and sludge pits; creating cells within the cap for disposal of contaminated soils and solidified sludges; and the formation of a ground water and surface water diversion system upgradient of the Megunko Hill.
- 1999 to 2001: excavation and on-site disposal of approximately 45,500 cubic yards of mercury-contaminated sediments from the Eastern Wetland, Trolley Brook, and Outfall Creek/Lower Raceway; the restoration of all excavated and impacted areas; and the replacement of 1,300 feet of waterline along Megunko Road.
- 1994: a pump test by Ebasco Services recovered DNAPL/DNAPL emulsion from a bedrock well (MW-113A) located behind the Worcester Air Conditioning building during the pump test activities for OU II.

#### 1.4 Operable Unit II Remedy

In June 1987, EPA authorized the initiation of investigative activities for OU II to address contaminated ground water migrating from the Site. The interim ROD for OU II was signed on September 23, 1991. The selected remedy included extraction and treatment of ground water for a minimum of five years and conducting additional studies before adoption of a final remedy. Technical design studies for the selected remedy began in early 1992. The discovery of DNAPLs raised concerns about the effectiveness of a pump and treat remedy, resulting in the design being postponed. The DNAPL was observed in 1994 during the installation of a pump-test extraction well at Worcester Air Conditioning. Since this time, EPA has been collecting additional data and examining other options for treating the contamination. It should be noted that the Town of Ashland does not use ground water from the contaminated plume for their drinking water supply.

Ground water monitoring was initiated in 1998 on a semi-annual basis and continued until 2004. The monitoring data suggested that the ground water contaminant concentrations and plume extent were not decreasing. The results prompted EPA to undertake indoor air sampling programs in 1998 and 2004 (in addition to one conducted in 1990) to determine if contaminants in the ground water are volatilizing and migrating into homes and businesses at levels that might affect public health. The results of the air sampling program are discussed in detail later in this report.

Between 1999 and 2003 several studies were conducted to evaluate potential ecological risks posed by the ground water plume discharging into the Sudbury River. Results indicated that aquatic life was impacted in one of the three areas studied, but that the impact could not definitively be tied to the ground water plume or other existing natural habitat conditions such as storm water runoff, low dissolved oxygen levels, stagnant water, and high amounts of detritus (leaf litter). Additional monitoring was recommended because this impacted area is directly upstream of the Lower Raceway, where mercury-contaminated sediments were excavated as part of OU III.

The results of the indoor air HHRA discussed in this report, along with the DNAPL Alternatives Memorandum (ICF, 2005), will be used to modify the existing OU II ROD through the development of an Explanation of Significant Differences (ESD).

#### 2.0 Available Data

The data collection performed at Nyanza OU II to date has included: an extensive ground water quality sampling program, river temperature profiling, river flow gauging, sediment sampling, surface water sampling, sediment pore water sampling, toxicity testing, and indoor air studies.

ICF compiled all available indoor air and ground water data in order to quantify potential exposure concentrations. We also used available reports to characterize the Site with respect to the parameters necessary for modeling indoor air concentrations due to vapor intrusion, such as physical ground water and soil properties, building characteristics, and other required model elements.

#### 2.1 Indoor Air Data

The available indoor air data consists of three rounds (1990, 1998, and 2004) of indoor air sampling conducted in the vicinity of the Site by EPA Region 1. EPA has determined that the available air data are useable for this HHRA. The data from each round of sampling are presented in three documents provided by EPA, as well as several data tables provided electronically by EPA, including:

- Indoor Air Screening Survey Results, December 1990.
- October 30, 1998 Memorandum. From: Peter Kahn. To: Sharon Hayes, EPA Region 1 Remedial Project Manager. Re: Final Report Indoor Air Sampling Screening Survey, Town Hall, Ashland, MA, October 1998. Sampling performed October 22, 1998.
- July 1, 2004 Memorandum. From: Peter Kahn. To: Cheryl Sprague, EPA Region 1 Remedial Project Manager. Re: Final Report Residential Indoor Air Study, Ashland, MA, May, 2004. Sampling performed May 24, 25, 26, and 27, 2004.
- A variety of electronic files; several of these files provided the same information as the hard copy reports listed above, but one provided additional November 1998 monitoring data, which has been included in the data compilation.

Based on the data provided, a total of 14 residences and two municipal buildings (Ashland Police Station and Ashland Town Hall) were sampled by EPA. Available indoor air data for the five target compounds (TCE, vinyl chloride, chlorobenzene, benzene, and 1,4-dichlorobenzene) included in EPA's sampling program are compiled in Table 2-1 (residences sampled by EPA were assigned Sample Location Identification Numbers, letters A through N that designate each residence). Table 2-2 shows additional basement property information, as available, for each EPA sampling location. Target compounds were originally selected by EPA based on the contaminants identified from the ground water data which had the highest concentrations and which had the greatest potential to volatilize out of ground water and migrate into buildings (as discussed in the

1998 and 2004 EPA Reports). Although soil gas data were collected from selected locations, these data are not presented in this indoor air HHRA. The soil gas data are not deemed to be as representative of site conditions as the larger data set of actual indoor air data.

EPA compared the indoor air data, at the time of sampling, to Massachusetts Department of Environmental Protections (MADEP) and EPA action levels (Table 2-3) to determine if action was necessary because of an imminent hazard to human health. These screening levels were calculated by EPA to provide conservative screening values for the indoor air data. MADEP action levels for indoor air represent a concentration below which, if breathed continuously (24 hrs/day, 350 days/year, 30 years), would not result in a cancer risk in excess of 1 in 10,000 (10<sup>-4</sup>) or a noncancer risk that would be more than 10 times the safe limit (Hazard Index = 10). Site-specific screening levels may be calculated using MADEP methodology (MADEP, 1991) and were calculated by EPA for risk management purposes. EPA action levels were calculated based on a cancer risk of 1 in 1,000 (10<sup>-3</sup>) and a noncancer hazard index of 10.

Screening levels (such as the MADEP and EPA action levels described above) may be based on potential adverse cancer or noncancer health effects. These effects are evaluated using toxicity values called cancer slope factors (CSF) or reference concentrations (as will be described further in the toxicity assessment section of this report). The screening level used in the 1990 and 1998 reports by EPA for TCE, 134  $\mu$ g/m³ (25 ppb/v) (the MADEP screening level based on an incremental cancer risk of 1 in 10,000 [10<sup>-4</sup>]), has changed. Since that time, the EPA has published a lower, provisional cancer slope factor range, based on a re-evaluation of the toxicity data for TCE (EPA, 2001a). The new provisional slope factors are presented as a range; according to EPA, a range is reasonable in view of the risk factors that can modify the effects of TCE in different populations. Based on the new, provisional cancer slope factor range published by the EPA (EPA, 2001a), the revised TCE screening levels are calculated as a range from 2 to 43  $\mu$ g/m³ (0.4 to 8 ppb/v).

#### 2.1.1 1990 Air Sampling

In 1990, five residences (a representative subset of the residences located over the contaminated ground water plume originating from the Nyanza Site) were sampled, along with two locations in the Ashland Town Hall. An ambient air sample was also collected outside Sample Location D/E (two-family home). The 1990 air samples were collected because the results of earlier EPA ground water sampling (data not shown in this report) showed that certain chemicals exceeded the Massachusetts Contingency Plan (MCP) Ground Water-2 (GW-2) criteria (based on volatilization potential to indoor air), suggesting the potential for volatilization of contaminants into indoor air. The 1990 indoor air samples were analyzed for benzene, TCE, and chlorobenzene. The results of the 1990 indoor air sampling are presented in Table 2-1 and are summarized as follows:

Benzene was detected in two of the residential locations at concentrations of 3 μg/m<sup>3</sup>
 (1 ppb/v) and in one residential location at 13 μg/m<sup>3</sup> (4 ppb/v); in ambient air at 10

 $\mu g/m^3$  (3 ppb/v); and in the Town Hall storage area at 3  $\mu g/m^3$  (1 ppb/v). None of the benzene concentrations exceeded the screening level range of 32-96  $\mu g/m^3$  (10-30 ppb/v).

- TCE was only detected in the Town Hall, at concentrations of 11 to 22 μg/m³ (2 to 4 ppb/v). At the time of this sampling event (1990), the detected concentrations did not exceed the existing screening level for TCE of 134 μg/m³ (25 ppb/v).
- Chlorobenzene was not detected in any of the indoor air samples collected in 1990.

It should be noted that the detection limits used in the earliest round of indoor air sampling (1990) were much higher than those used in subsequent sampling rounds. For example, the detection limit for benzene and TCE during 1990 was 5  $\mu$ g/m³ (1 ppb/v), while subsequently, the detection limits were approximately 1  $\mu$ g/m³ (0.2 ppb/v), as shown in Table 2-1.

#### 2.1.2 1998 Air Sampling

EPA performed additional indoor air sampling in 1998 due to the continued exceedance of the MCP GW-2 vapor intrusion screening criteria in ground water at the Site.

On October 22, 1998, three rooms in the basement of the Ashland Town Hall were sampled and analyzed for TCE, vinyl chloride, benzene, chlorobenzene, and 1,4-dichlorobenzene. One ambient air sample was also collected outside the Town Hall. The results of the 1998 indoor air sampling are summarized as follows:

- Neither vinyl chloride nor chlorobenzene was detected.
- Benzene was detected at concentrations ranging from 0.7 to 1.2  $\mu$ g/m<sup>3</sup> (0.21 to 0.36 ppb/v), below the screening level of 32-96  $\mu$ g/m<sup>3</sup> (10-30 ppb/v).
- TCE was detected in all three rooms at concentrations ranging from 6.4 to 7.3 µg/m<sup>3</sup> (2.0 to 2.3 ppb/v). At the time of this sampling event (1998), the detected concentrations did not exceed the screening level for TCE of 134 µg/m<sup>3</sup> (25 ppb/v) that existed at that time.
- 1,4-Dichlorobenzene was also detected in all three rooms at concentrations of 1.1 to 1.5  $\mu$ g/m<sup>3</sup> (0.19 to 0.25 ppb/v), well below the screening level of 7,813  $\mu$ g/m<sup>3</sup> (1,300 ppb/v).

In November 1998, EPA collected indoor air samples from nine homes, three rooms in the Town Hall, and the Ashland Police Dispatch room. Ambient (outdoor) air was also sampled at one home and at the Town Hall. Some of the 1998 data are presented in the 2004 EPA Report, while the remainder (including the Town Hall, Police Dispatch, and three homes) were found in a table entitled "Summary of November 1998 Indoor Air Results," provided to ICF by EPA as a separate electronic file (results2.wpd). All 1998 air data are shown in Table 2-1.

The results of the November 1998 indoor air sampling data collected by EPA are summarized below:

- Vinyl chloride (detected in 2/9 homes), benzene (detected in 9/9 homes), chlorobenzene (detected in 1/9 homes), and 1,4-dichlorobenzene (detected in 6/9 homes) were all detected, but did not exceed their respective screening levels.
- TCE was detected in 8 of the 9 homes, the Town Hall, and the Police Dispatch at concentrations ranging from 0.6 to  $22 \,\mu g/m^3$  (0.2 to 7 ppb/v). These results were all below the screening level of  $134 \,\mu g/m^3$  (25 ppb/v) that existed at the time of sampling.

#### 2.1.3 2004 Air Sampling

EPA added an additional sampling round in May of 2004 after a review of the proposed revision to the TCE cancer slope factor indicated a potential risk from vapor intrusion at the Site, based on the previous indoor air data sets. Ground water monitoring at the Site also indicated no significant changes to the concentrations within or the overall extent of the plume. Ground water monitoring indicated that many areas of the Site remained in excess of the MCP GW-2 screening criteria for vapor intrusion.

In 2004, seven homes were sampled; one home was added and 3 homes sampled in 1998 were not re-sampled. The Police Dispatch and the Town Hall were not sampled during 2004. At that time, the Town Hall was under construction and an accurate sample could not be obtained. The homes sampled were: 1) located within an area where contaminant concentrations in ground water exceeded the MCP GW-2 or GW-1 criteria (MADEP, 2003), 2) where the owner agreed to participate in the study, and 3) where the basement had a dirt floor or areas where soil gas could move into the homes, such as sumps or pipes coming through the wall. An attempt was made to use the same sampling locations used in the 1998 survey, where possible. The air sampling results are presented in Table 2-1 and summarized below:

- Neither vinyl chloride nor chlorobenzene were detected.
- 1,4-Dichlorobenzene was detected once, but at a concentration well below the screening level of 7,813  $\mu$ g/m<sup>3</sup> (1,300 ppb/v).
- Benzene was detected in five homes at concentrations ranging from 0.5 to 42 μg/m³ (0.15 to 13 ppb/v), the highest concentration occurring in the basement of Sample Location L. This sample was the only one to exceed the lower end of the screening level range of 32-96 μg/m³ (10-30 ppb/v) for benzene. The 2004 EPA report states, however, that in this home, other sources of benzene, such as petroleum products, may have existed, since other compounds associated with gasoline and oil (such as toluene, ethylbenzene, heptane, hexane, etc.) were detected.
- Ambient air sampling in 2004 detected only benzene outside one home, at a concentration less than the screening level.
- TCE was detected in three homes at concentrations (ranging from 1.3 to 2.9 μg/m<sup>3</sup> [0.25 to 0.72 ppb/v]) exceeding the revised screening level range (2 to 43 μg/m<sup>3</sup> [0.4 to 8 ppb/v]).

The exceedances of the revised screening level range for TCE indicated a potential risk associated with indoor air. Therefore, this inhalation HHRA is being conducted to more

accurately assess the potential indoor air risks in structures located over the Nyanza ground water plume.

#### 2.2 Ground Water Data

Ground water analytical data from the semi-annual monitoring program performed from the years 1998 to 2004 was used in the indoor air modeling. A subset of wells from these monitoring events was selected for inclusion in this HHRA using the step-wise approach described below. Our review of the available ground water data since 1998 indicated that inclusion of the 1998 and 1999 data provided a better spatial coverage of the plume area.

First, only monitoring wells whose detected contaminant concentrations (based on the Fall 2003 semi-annual sampling event) are greater than MCP GW-1 standards were included in the subset. The MCP GW-1 standards are used in order to be conservative, as these standards are based on potential risks associated with ground water ingestion<sup>1</sup>, and are usually lower than the GW-2 criteria for screening vapor intrusion. GW-1 standards are used in this HHRA only as conservative screening criteria for selecting ground water monitoring wells to include in the HHRA. All wells that exceeded GW-1 standards are included in the HHRA, to ensure that the data used are representative of contaminant levels over the entire Nyanza plume area.

Because ground water is characterized as GW-2 in the MCP if it is located within 30 feet of an existing occupied building or structure and if the average annual depth to ground water is 15 feet or less, the GW-2 criteria are relevant at this Site. Exceedances of the GW-2 screening criteria represent potential areas of concern for vapor intrusion. The average annual depth to ground water for monitoring wells in the area of interest at the Site (using ground water data from semi-annual monitoring events since 1998) is approximately 7 feet (Table 2-4, see column labeled "Range in Depth to Ground Water").

Secondly, only wells screened fully or partially in the overburden aquifer were selected. Wells screened in deep bedrock were not selected, because contaminated ground water located in deep bedrock (i.e., 35 to 40 feet below ground surface) is too deep for vapor intrusion into overlying structures. Bedrock depths in the residential and commercial areas associated with the Site are typically greater than 35 to 40 feet. In most cases where a bedrock well was not selected, a corresponding overburden well at the same location (i.e., a well couplet) was selected for inclusion. Ground water data from the overburden well at such a location would be more applicable to a vapor intrusion assessment than a deeper bedrock well.

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<sup>&</sup>lt;sup>1</sup> GW-1 standards are based on either a Massachusetts MCL (drinking water standard) if one exists or is usually based on the lowest of the following three criteria: (1) 20% of an allowable intake based on noncancer health effects; (2) an excess lifetime cancer risk equal to one-in-one million (10<sup>-6</sup>); or (3) a 50% odor recognition threshold. Additionally, the Practical Quantitation Limit and background are also considered.

As shown in Table 2-4 and Figure 2-1, a total of 39 well locations fit the above criteria for inclusion in the HHRA. However, only 22 of these had ground water data available for the years 1998 to 2004. Many of the wells that do not have data available from 1998 to 2004 were installed solely for ground water elevation monitoring purposes, or were only sampled and analyzed during the 1980s as part of the initial OU I and OU II remedial investigations. Regardless, the 22 wells that do have ground water data for the years 1998 to 2004 provide good spatial coverage over the entire contaminant plume area, as illustrated in Figure 2-1. Additionally, the 22 selected wells also have screened interval depths that are applicable to a vapor intrusion assessment – most of the screened intervals are less than 25 feet deep. Table 2-4 also shows the range of detected TCE concentrations in the wells with data available from 1998 to 2004.

The ground water analytical data for the 22 selected wells are presented in Appendix A. All data are presented, including non-detects. Data with a "J" qualifier (estimated value) are included in the HHRA, as these data were deemed useable during the data validation performed during each round of ground water sampling. These data were compiled from each of the semi-annual ground water monitoring reports prepared by Roy F. Weston, Arthur D. Little, and ICF Consulting from 1998 to 2004. The ground water data are discussed further in the Tier 2 screening (Section 4).

#### 2.3 Building Characteristics

The Nyanza ground water plume underlies an area that includes residential neighborhoods and municipal, commercial, and industrial buildings. To support the indoor air modeling using ground water data, a variety of site-specific parameters were collected for "typical" residential and industrial/commercial structures in the plume area, in order to model a "typical" residential home and a "typical" commercial/industrial building over the plume. If no site-specific values were available, default values (from the Johnson-Ettinger indoor air model [1991] and EPA, 2003a) are applied. Building-related properties used for the modeling are summarized in Table 2-5.

The characteristics of typical residences and businesses in the area were compiled. For both residential and commercial/industrial structures, we used estimations (obtained from the Site base map) of the footprints (square feet) of the structures within the contaminated ground water plume area to provide average and upper bound structure sizes. Figure 2-2 illustrates the structures that were identified as residential and those that were identified as commercial/industrial. Information found in the EPA air sampling reports discussed in Section 2.1 was used to confirm the footprint sizes of the residences, and to determine typical residential basement types in the area. From this information, it was determined that two types of residences should be modeled – those with below-grade concrete basements and those with below-grade dirt floor basements. Slab-on-grade construction is assumed for the commercial/industrial structures. Table 2-6 provides the resulting average and upper bound residential and commercial/industrial structure sizes. The residential sizes are consistent with the sizes of the homes previously sampled by EPA in the town.

Table 2-1a: Indoor Air Data, Nyanza OU II (in ppb/v)

Sample Location	Tr	ichloroethyl (ppb/v)	ene		Vinyl Chloride (ppb/v)			Benzene (ppb/v)			Chlorobenzene (ppb/v)		1,4-	Dichloroben:	zene
	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990		May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004
A Basement First Floor	NA NA	1.0 0.20 L	0.72 ND (0.26)	NA NA	ND (0.20) ND (0.20)	ND (0.28) ND (0.26)	NA NA	0.30 0.40	0.41 ND (0.26)	NA NA	ND (0.20) ND (0.20)	ND (0.27) ND (0.26)	NA NA	0.04 L ND (0.20)	ND (0.27) ND (0.26)
B Basement First Floor	NA NA	NA NA	ND (0.24) ND (0.44)	NA NA	NA NA	ND (0.24) ND (0.45)	NA NA	NA NA	0.67 ND (0.44)	NA NA	NA NA	ND (0.24) ND (0.44)	NA NA	NA NA	ND (0.24) ND (0.44)
C* Basement First Floor	NA NA	ND (0.2) ND (0.2)	NA NA	NA NA	ND (0.2) ND (0.2)	NA NA	NA NA	0.4 ND (0.2)	NA NA	NA NA	ND (0.2) ND (0.2)	NA NA	NA NA	ND (0.2) ND (0.2)	NA NA
D Basement (concrete)	ND (1)	NA	NA	NA	NA	NA	1	NA	NA	ND (7)	NA	NA	NA	NA	NA
E Basement (concrete) Ambient Air	ND (1) ND (1)	NA NA	NA NA	NA NA	NA NA	NA NA	1 3	NA NA	NA NA	ND (7) ND (7)	NA NA	NA NA	NA NA	NA NA	NA NA
F Basement First Floor	NA NA	1.0 0.60	0.40 NA	NA NA	ND (0.20) ND (0.20)	ND (0.28) NA	NA NA	3.0 2.4	ND (0.28) NA	NA NA	ND (0.20) ND (0.20)	ND (0.28) NA	NA NA	ND (0.20) ND (0.20)	ND (0.28) NA
G* Basement First Floor	NA NA	7 5	NA NA	NA NA	ND (0.2) ND (0.3)	NA NA	NA NA	0.9 1	NA NA	NA NA	ND (0.2) ND (0.3)	NA NA	NA NA	ND (0.2) ND (0.3)	NA NA
H* Basement First Floor	NA NA	0.9 0.4	NA NA	NA NA	ND (0.2) ND (0.2)	NA NA	NA NA	0.2B 0.5	NA NA	NA NA	ND (0.2) ND (0.2)	NA NA	NA NA	ND (0.2) 0.01 B,L	NA NA
Basement, at floor level (fieldstone/concrete block walls, dirt floors)		NA	NA	NA	NA	NA	ND (1)	NA	NA	ND (7)	NA	NA	NA	NA	NA
Basement, 5' above floor Basement, back corner	ND (1) ND (1)	NA NA	NA NA	NA NA	NA NA	NA NA	ND (1) ND (1)	NA NA	NA NA	ND (7) ND (7)	NA NA	NA NA	NA NA	NA NS	NA NA
J Basement First Floor	NA NA	ND (0.20) 0.2	ND (0.26) ND (0.28)	NA NA	ND (0.20) 0.10 L	ND (0.26) ND (0.29)	NA NA	0.20 B,L 0.50	ND (0.26) ND (0.28)	NA NA	ND (0.20) 0.10 L	ND (0.26) ND (0.28)	NA NA	ND (0.20) 0.10 L	ND (0.26) ND (0.28)
K Basement First Floor	NA NA	1.0 0.40	ND (0.30) ND (0.29)	NA NA	0.20 L ND (0.20)	ND (0.30) ND (0.29)	NA NA	0.50 0.40	0.29 L 0.27 L	NA NA	ND (0.20) ND (0.20)	ND (0.30) ND (0.29)	NA NA	0.10 L 0.40	ND (0.30) ND (0.29)
L Basement First Floor	NA NA	0.30 0.20 L	ND (1.2) ND (1.1)	NA NA	ND (0.20) ND (0.20)	ND (1.2) ND (1.1)	NA NA	3.0 2.0	13 7.2	NA NA	ND (0.20) ND (0.20)	ND (1.2) ND (1.1)	NA NA	0.20 L 0.10 L	1.7 ND (1.1)

Table 2-1a: Indoor Air Data, Nyanza OU II (in ppb/v) (cont'd)

Sample Location	Tri	ichloroethyl	ene		Vinyl Chloride			Benzene			Chlorobenzene		1,4-	-Dichloroben	zene
		(ppb/v)	_		(ppb/v)	_		(ppb/v)	_		(ppb/v)	_		(ppb/v)	_
	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004
M															
Basement															
(fieldstone/concrete															
block walls, concrete															
floors)	ND (1)	1.6	0.47	NA	ND (0.20)	ND (0.23)	4	1.2	0.56	ND (7)	ND (0.20)	ND (0.22)	NA	ND (0.20)	ND (0.22)
First Floor	NA	1.9	0.25 L	NA	ND (0.20)	ND (0.28)	NA	1.4	0.42	NA	ND (0.20)	ND (0.27)	NA	0.04 B,L	ND (0.26)
N															
Basement (concrete walls															
and floor)	ND (1)	NA	NA	NA	NA	NA	ND (1)	NA	NA	ND (7)	NA	NA	NA	NA	NA
Ambient/ Background*^	NA	0.20	ND (0.20)	NA	ND (0.20)	ND (0.05)	NA	0.80	0.15 L	NA	ND (0.20)	ND (0.20)	NA	ND (0.20)	ND (0.20)
Town Hall*															
		2.1 (Oct.)			ND (0.16) (Oct.)			0.21 (Oct.)			ND (0.16) (Oct.)			0.19 (Oct.)	
Storage Area	4	2 (Nov.)	NA	NA	ND (0.2) (Nov.)	NA	1	0.4B (Nov.)	NA	ND (7)	ND (0.2) (Nov.)	NA	NA	0.1L (Nov.)	NA
Health Office, floor level															
(1990 data only)	2	NA	NA	NA	NA	NA	ND (1)	NA	NA	ND (7)	NA	NA	NA	NA	NA
Health Office, 4' or 5'		2.3 (Oct.)			ND (0.16) (Oct.)			0.36 (Oct.)			ND (0.16) (Oct.)			0.24 (Oct.)	
above floor	2	2.3 (Oct.) 2 (Nov.)	NA	NA	ND (0.10) (Oct.) ND (0.2) (Nov.)	NA	ND (1)	0.30 (Oct.) 0.4B (Nov.)	NA	ND (7)	ND (0.10) (Oct.) ND (0.2) (Nov.)	NA	NA	0.24 (Oct.) 0.1L (Nov.)	NA
above floor	2	2 (NOV.)	INA	NA	ND (0.2) (NOV.)	INA	ND(1)	0.4 <b>D</b> (NOV.)	NA	ND(/)	ND (0.2) (NOV.)	NA	NA	0.1L (NOV.)	NA
Youth Advisory Board		2 (Oct.)			ND (0.16) (Oct.)			0.24 (Oct.)			ND (0.16) (Oct.)			0.25 (Oct.)	
Room	NA	1 (Nov.)	NA	NA	ND (0.3) (Nov.)	NA	NA	0.4B (Nov.)	NA	NA	ND (0.3) (Nov.)	NA	NA	0.1L (Nov.)	NA
		()			(3.3.7)			(2.12.1)			(3.2)			(=1010)	
Ambient Air		0.49			ND (0.16)			0.28 B			ND (0.16)			0.23 B	
Police Department*					_										
Dispatch Room		0.1 L	NA 1000 X	NA	ND (0.2)	NA	NA	0.4	NA	NA	ND (0.2)	NA	NA	0.1 B,L	NA

<sup>\*</sup>Data from table entitled "Summary of November 1998 Indoor Air Results" provided as a separate electronic file (results2.wpd)

**NOTES:** ND = Not detected above reporting limits

<sup>^</sup>The exact location of the ambient/background air from the "Summary of November 1998 Indoor Air Results" table is unknown.

L = Estimated value, is below the calibration range

B = Analyte is associated with blank contamination

NA = Not applicable, no data collected

Table 2-1b: Indoor Air Data, Nyanza OU II (in μg/m³)

Sample Location	Tr	ichloroethyl	ene		Vinyl Chloride			Benzene			Chlorobenzene		1,4	-Dichlorobenz	ene
	Dec. 1990	(μg/m³) Nov. 1998	May 2004	Dec. 1990	(μg/m³) Nov. 1998	May 2004	Dec. 1990	(μg/m³) Nov. 1998	May 2004	Dec. 1990	(μg/m³) Nov. 1998	May 2004	Dec. 1990	(μg/m³) Nov. 1998	May 2004
A Basement First Floor	11	5.4 1.1 L	3.9 ND (1.4)	NA NA	ND (0.51) ND (0.51)	ND (0.72) ND (0.66)	NA NA	1.0 1.3	1.3 ND (0.83)	NA NA	ND (0.92) ND (0.92)	ND (1.2) ND (1.2)	NA NA	0.24 L ND (1.2)	ND (1.6) ND (1.6)
B Basement First Floor	II .	NA NA	ND (1.3) ND (2.4)	NA NA	NA NA	ND (0.61) ND (1.2)	NA NA	NA NA	2.1 ND (1.4)	NA NA	NA NA	ND (1.1) ND (2.0)	NA NA	NA NA	ND (1.4) ND (2.6)
C*  Basement  First Floor	II	ND (1.1) ND (1.1)	NA NA	NA NA	ND (0.51) ND (0.51)	NA NA	NA NA	1.3 ND (0.64)	NA NA	NA NA	ND (0.92) ND (0.92)	NA NA	NA NA	ND (1.2) ND (1.2)	NA NA
D Basement (concrete)	ND (5.4)	NA	NA	NA	NA	NA	3.2	NA	NA	ND (32)	NA	NA	NA	NA	NA
Basement (concrete) Ambient Air	11 . (- ,	NA NA	NA NA	NA NA	NA NA	NA NA	3.2 9.6	NA NA	NA NA	ND (32) ND (32)	NA NA	NA NA	NA NA	NA NA	NA NA
Basement First Floor	II .	5.4 3.2	2.1 NA	NA NA	ND (0.51) ND (0.51)	ND (0.72) NA	NA NA	9.6 7.7	ND (0.89) NA	NA NA	ND (0.92) ND (0.92)	ND (1.3) NA	NA NA	ND (1.2) ND (1.2)	ND (1.7) NA
G* Basement First Floor	11	38 27	NA NA	NA NA	ND (0.51) ND (0.77)	NA NA	NA NA	2.9 3.2	NA NA	NA NA	ND (0.92) ND (1.4)	NA NA	NA NA	ND (1.2) ND (1.8)	NA NA
H* Basement First Floor	II .	4.8 2.1	NA NA	NA NA	ND (0.51) ND (0.51)	NA NA	NA NA	0.64 B 1.6	NA NA	NA NA	ND (0.92) ND (0.92)	NA NA	NA NA	ND (1.2) 0.060 B,L	NA NA
Basement, at floor level (fieldstone/concrete block walls, dirt floors)		NA	NA	NA	NA	NA	ND (3.2)	NA	NA	ND (32)	NA	NA	NA	NA	NA
Basement, 5' above floor Basement, back corner	II ` ′	NA NA	NA NA	NA NA	NA NA	NA NA	ND (3.2) ND (3.2)	NA NA	NA NA	ND (32) ND (32)	NA NA	NA NA	NA NA	NA NA	NA NA
J Basement First Floor		ND (1.1) 1.1	ND (1.4) ND (1.5)	NA NA	ND (0.51) 0.26 L	ND (0.66) ND (0.74)	NA NA	0.64 B,L 1.6	ND (0.83) ND (0.89)	NA NA	ND (0.92) 0.46 L	ND (1.2) ND (1.3)	NA NA	ND (1.2) 0.60 L	ND (1.6) ND (1.7)
K Basement First Floor	II .	5.4 2.1	ND (1.6) ND (1.6)	NA NA	0.51 L ND (0.51)	ND (0.77) ND (0.74)	NA NA	1.6 1.3	0.93 L 0.86 L	NA NA	ND (0.92) ND (0.92)	ND (1.4) ND (1.3)	NA NA	0.60 L 2.4	ND (1.8) ND (1.7)
L Basement First Floor	11	1.6 1.1 L	ND (6.4) ND (5.9)	NA NA	ND (0.51) ND (0.51)	ND (3.1) ND (2.8)	NA NA	9.6 6.4	42 23	NA NA	ND (0.92) ND (0.92)	ND (5.5) ND (5.1)	NA NA	1.2 L 0.60 L	1.7 ND (6.6)

Table 2-1b: Indoor Air Data, Nyanza OU II (in μg/m³) (continued)

Sample Location	Tri	ichloroethyl	ene		Vinyl Chloride			Benzene			Chlorobenzene		1,4	l-Dichlorobenze	ene
		$(\mu g/m^3)$			$(\mu g/m^3)$			$(\mu g/m^3)$			$(\mu g/m^3)$			$(\mu g/m^3)$	
	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004	Dec. 1990	Nov. 1998	May 2004
M															
Basement															
(fieldstone/concrete															
block walls, concrete															
floors)	ND (5.4)	8.6	2.5	NA	ND (0.51)	ND (0.59)	13	3.8	1.8	ND (32)	ND (0.92)	ND (1.0)	NA	ND (1.2)	ND (1.3)
First Floor	NA	10.2	1.3 L	NA	ND (0.51)	ND (0.72)	NA	4.5	1.3	NA	ND (0.92)	ND (1.2)	NA	0.24 B,L	ND (1.6)
N D															
Basement (concrete walls	NTD (5.4)	27.4	374	27.1	37.	374	NTD (2.2)	37.4		NTD (22)	27.4	37.4		374	37.4
and floor) Ambient/ Background*^	ND (5.4) NA	NA	NA ND (1.1)	NA NA	NA ND (0.5)	NA ND (0.12)	ND (3.2)	NA 2.6	NA 0.49 I	ND (32)	NA ND (0.02)	NA ND (0.02)	NA NA	NA ND (1.2)	NA ND (1.2)
Town Hall*	NA	1.1	ND (1.1)	NA	ND (0.5)	ND (0.13)	NA	2.6	0.48 L	NA	ND (0.92)	ND (0.92)	NA	ND (1.2)	ND (1.2)
10wn nan*		11 (Oct.);			ND (0.41) (Oct.);			0.67 (Oct.);			ND (0.74) (Oct.);			1.1 (Oct.);	
Storage Area	22	11 (Oct.), 11 (Nov.)	NA	NA	ND (0.41) (Oct.), ND (0.51) (Nov.)	NA	3.2	1.3 B (Nov.)	NA	ND (32)	ND (0.74) (Oct.), ND (0.92) (Nov.)	NA	NA	0.60 L (Nov.)	NA
Storage Area	22	11 (1101.)	INA	IVA	ND (0.51) (NOV.)	INA	3.2	1.3 B (NOV.)	IVA	ND (32)	ND (0.92) (NOV.)	IVA	INA	0.00 L (NOV.)	IVA
Health Office, floor level															
(1990 data only)	11	NA	NA	NA	NA	NA	ND (3.2)	NA	NA	ND (32)	NA	NA	NA	NA	NA
(1>>0 data om))	••	1,1.1	1,11	1,1.1	1,11	1,11	11.2 (8.2)	1,1.1	1,11	112 (32)	1112	1,11	''''	1,12	1,11
Health Office, 4' or 5		12 (Oct.);			ND (0.41) (Oct.);			1.2 (Oct.);			ND (0.74) (Oct.);			1.4 (Oct.);	
above floor	11	11 (Nov.)	NA	NA	ND (0.51) (Nov.)	NA	ND (3.2)	1.3 B (Nov.)	NA	ND (32)	ND (0.92) (Nov.)	NA	NA	0.60 L (Nov.)	NA
		, ,			, , , , ,		<b>\</b> \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	, í		l '	, , , , , ,			. ,	
Youth Advisory Board		11 (Oct.);			ND (0.41) (Oct.);			0.77 (Oct.);			ND (0.74) (Oct.);			1.5 (Oct.);	
Room	NA	5.4 (Nov.)	NA	NA	ND (0.77) (Nov.)	NA	NA	1.3 B (Nov.)	NA	NA	ND (1.4) (Nov.)	NA	NA	0.60 L (Nov.)	NA
Ambient Air		2.6			ND (0.41)			0.89 B			ND (0.74)			1.4 B	
Police Department*															
Dispatch Room	NA	0.54 L	NA	NA	ND (0.51)	NA	NA	1.3	NA	NA	ND (0.92)	NA	NA	0.60 B,L	NA

<sup>\*</sup>Data from table entitled "Summary of November 1998 Indoor Air Results" provided as a separate electronic file (results2.wpd)

<sup>^</sup>The exact location of the ambient/background air from the "Summary of November 1998 Indoor Air Results" table is unknown.

**NOTES:** ND = Not detected above reporting limits

L = Estimated value, is below the calibration range

B = Analyte is associated with blank contamination

NA = Not applicable, no data collected

Table 2-2: Characterization of Indoor Air Sampling Locations

Location <sup>1</sup>	ID	Туре	Basement Properties	Basement size (if available)	Approx TCE GW Conc. <sup>2</sup> (µg/L)	Notes	EPA Source Report
Residences	_				4.37		
	A	single family	concrete floor with cinder block walls	954 sq ft	1,100 (MW-201, ~200')	2-inch drain pipe went down approx 1 foot below floor and floor drains present; 14 paint cans (oil, latex, spray) and some household cleaners stored in basement	July 2004
	В	single family	stone/granite foundation; gravel floor (1870 house)	806 sq ft	200 (MW-304B, 100')	small amt of water present in sump pump hole in basement; gas and water lines protrude through basement wall (and large hole); unused lawnmower and latex paints in basement	July 2004
	$\mathbb{C}^3$	single family			310 (MW-204B, ~200')		
	D E	. two-family	concrete walls and floor; good condition, no major cracks		310 (MW-204B, ~100')	no visible signs of paints, oil, gasoline, solvents or cleaners stored; no standing water at time of sampling, but water stains on walls and floor; gas and water	Dec 1990
	L					pipes enter wall at floor level	
	F	business on first floor, residence on second	foundation: footings on earth; concrete slab (finished, carpeted floors with lunch room, x-ray room, nursery area, bath room and storage areas)	1700 sq ft	5,700 (MW-115B, ~250')	paint in basement; no obvious areas where soil gas could migrate into basement	July 2004
	$G^3$	single family			5,700 (MW-115B, <50')		
	$H^3$	single family			~3,000 (ave of MW- 115B and MW-302)		
	Ι	single family	fieldstone/concrete block walls, dirt floor		870 (MW-302, ~250')	no visible signs of paints, gasoline, solvents or cleaners stored and no standing water; however, small amt of fuel oil recently spilled on floor during natural gas conversion	Dec 1990
	J	two-family	stone foundation with granite sills; concrete floor	6'4"; 1176 sq ft	1,200 (MW-203B, ~100')	sump pump in basement; small hole in floor at east wall; a few small paint cans in basement; partially filled oil tank remains in basement	July 2004
	K	duplex	concrete slab	7'4"; 1208 sq ft	~3,400 (ave of MW- 201 and MW- 115B)	part of basement sectioned off as living room/kids play area	July 2004

Table 2-2: Characterization of Indoor Air Sampling Locations (continued)

Location <sup>1</sup>	ID	Туре	Basement Properties	Basement size (if available)	Approx TCE GW Conc. <sup>2</sup> (µg/L)	Notes	EPA Source Report
	L	duplex	rock foundation with concrete slab	7'5"; 1534 sq ft	~2,000 (ave of MW-6B, MW-201, MW-115B, and MW-302)	basement area sectioned off (part used as play area for kids); hole in wall near where waterline enters through floor; open area around rock protruding through concrete slab had been fixed since 1998 survey and no visible gaps in this area; machinery and	July 2004
	М	single family	fieldstone/concrete block walls, concrete floors; walls in good condition, minor cracks visible in floor	8'; 986 sq ft	300 (MW-6B, ~150')	sump pump hole in basement (moved since 1998 survey) with 1-2 inches of water; water stains on walls and floors; household cleaners in basement, as well as a heating oil tank and oil furnace, paints, stains, and solvents	Dec 1990; July 2004
	N	single family	concrete walls and floor; walls in good condition, minor cracks visible in floor		37 (MW-6A, ~150')	no standing water but 1-2 inches of water in sump and water stains on walls and floor; partially filled unused leaking heating oil tank, paints, stains, solvents, and cleaners stored in basement	Dec 1990
Municipal Bu	ildin	igs					
Town Hall		Utility/storage area (three rooms)	stone and concrete; fairly good condition (1990); floor area around water pipe in 2nd room is void of concrete, showing soil (1998)		870 (MW-302,	no standing water, visible water stains or signs of paints, soil, gasoline, solvents or cleaners stored in areas; drain pipe in wall (1990); main water line comes up through floor (and dirt around pipe is discolored/stained) (1998)	Dec1990; Oct 1998
		Board of Health office (one room)	concrete floor in basement		~100')	spray bottle of Fantastic cleaner and can of furniture polish in room	Dec 1990
		Youth Advisory Board room	concrete basement				Oct 1998
Police Department <sup>3</sup>					Not Detected (MW-404B and MW- 406B)		

#### Notes:

<sup>&</sup>lt;sup>1</sup> These properties, selected by EPA for indoor air monitoring in July, 2004, are potentially at the highest risk in the area adjacent to the site because they are: (1) within the plume area that exceeds the GW-2 standards for the target VOCs, which contai

<sup>&</sup>lt;sup>2</sup> Approximate TCE ground water concentrations are from Fall 2003 Semi-Annual Ground Water Monitoring Report, Figure 4-1 (ICF, August 31, 2004). Concentrations are from nearest overburden monitoring well (distance noted), or average of equidistant wells.

<sup>&</sup>lt;sup>3</sup> Basement property information not available in EPA reports.

Table 2-3: Historic Indoor Air Screening Levels

Benzene (C)	$32-96 \mu g/m^3$	$319-958  \mu g/m^3$
	(10-30  ppb/v)	(100-300 ppb/v)
Trichloroethene (C)	$134 \mu\mathrm{g/m}^3$	$1391  \mu \text{g/m}^3$
	(25 ppb/v)	(250 ppb/v)
	Revised <sup>3</sup> :	Revised <sup>3</sup> :
	$2-43  \mu g/m^3$	$22-424 \mu g/m^3$
	(0.4-8  ppb/v)	(4-79 ppb/v)
Vinyl chloride (C)	$3 \mu g/m^3$	$26 \mu\mathrm{g/m}^3$
	(1 ppb/v)	(10 ppb/v)
Chlorobenzene (NC)	$552 \mu\mathrm{g/m}^3$	$552  \mu g/m^3$
	(120 ppb/v)	(120 ppb/v)
1,4-Dichlorobenzene (NC)	$7,813  \mu g/m^3$	$7,813  \mu \text{g/m}^3$
	(1,300 ppb/v)	(1,300 ppb/v)

#### **Notes:**

- 1 MADEP screening levels for indoor air represent a concentration below which, if breathed continuously (24 hrs/day, 350 days/year, 30 years), would not result in a cancer risk in excess of 1 in 10,000 (10<sup>-4</sup>) or a noncancer risk that would be more than 10 times the safe limit (Hazard Index=10).
- 2 Screening levels were calculated by EPA for risk management purposes based on a cancer risk of 10<sup>-3</sup> and a noncancer hazard index of 10.
- 3 Recalculated using the draft EPA range of cancer slope factors for TCE (EPA, 2001a).

C = carcinogenic

NC = noncarcinogenic

Table 2-4: Monitoring Wells Selected for Use in Indoor Air HHRA

_			_		
		40.0	27.0 10.0		
ERT-1D (4-inch)*	OB/BR	40.0	35.0 - 40.0	NA	NA
ERT-1S (2-inch)*	OB	13.0	8.0 - 13.0	NA	NA
ERT-1I (2-inch)*	OB	23.5	18.5 - 23.5	NA	NA
ERT 2	OB	30.0	25.0 - 30.0	NA	200
MW-4A	OB	24.0	4.0 - 24.0	4.6 - 8.8	not detected
MW-4B	OB/BR	68.0	48.0 - 68.0	5.0 - 7.8	84 - 160
MW-5A*	OB	39.0	4.0 - 39.0	NA	NA
MW-6A	OB	12.0	7.0 - 12.0	2.4 - 5.3	37 - 90
MW-6B	OB	18.0	8.0 - 18.0	2.0 - 5.4	220 - 580
MW-8*	OB	NA	NA	NA	NA
MW-9A	OB	33.0	5.5 - 33.0	3.4 - 7.3	4.5
MW-9C*	OB	16.0	11.0 - 16.0	NA	NA
MW-10A	OB/BR	11.8	6.8 - 11.8	19.2 - 19.2	36
MW-11*	OB	16.0	6.0 - 16.0	NA	NA
MW-102B	OB	15.6	10.6 - 15.6	0.9 - 6.1	3.7 - 12
MW-104B	OB	15.4	10.4 - 15.4	0.9 - 10.3	10 - 14
MW-105*	OB	25.5	20.5 - 25.5	NA	NA
MW-106*	OB	23.8	18.8 - 23.8	NA	NA
MW-108*	OB	29.6	24.6 - 29.6	NA	NA
MW-109*	OB	24.0	19.0 - 24.0	NA	NA
MW-111	OB	27.0	22.0 - 27.0	2.8 - 5.0	28
MW-112B	OB	30.0	25.0 - 30.0	2.3 - 6.7	2.5 - 76
MW-113B	OB	29.5	24.5 - 29.5	1.0 - 5.5	9.9 - 840
MW-115B	OB	48.5	43.5 - 48.5	6.0 - 9.0	4,600 – 6,900
MW-201	OB	20.0	15.0 - 20.0	10.4 - 11.7	790 – 1,200
MW-202	OB	25.0	20.0 - 25.0	7.6 - 9.0	1,900
MW-203B	OB	32.0	27.0 - 32.0	4.2 - 6.7	490 – 1,600
MW-204B	OB	28.6	23.6 - 28.6	7.7 - 9.8	130 - 320
MW-302	OB	25.0	20.0 - 25.0	7.4 - 10.9	610 - 960
MW-304B	OB	30.7	25.7 - 30.7	3.5 - 6.0	3.4 - 600
MW-305B	OB	19.5	14.5 - 19.5	6.6 - 9.1	3.3 - 71
MW-405B	OB	45.6	40.6 - 45.6	0.6 - 3.8	4,300 – 7,600
MW-503A	OB	15.0	5.0 - 15.0	3.9 - 13.0	3.4
P-1*	OB	42	39 - 42	NA	NA
P-1S*	OB	18	8 - 18	NA	NA
P-2*	OB	43	40 - 43	NA	NA
P-3*	OB	42	NA	NA	NA
P-4*	OB	32.5	29.5 - 32.5	NA	NA
P-5*	OB	43	38 - 43	NA	NA

**Notes:** 1. TCE concentration range from samples collected between 1998 – 2004; a single value indicates only one relevant sample available from that well.

NA = Data not available from between 1998 and 2004.

bgs = below ground surface

OB = Overburden; BR = Bedrock

Table 2-5: Values and Sources for Model Input Parameters for Soil/Ground Water and Building Properties

Soil/Ground Water Prop	erties				
Average ground water temperature	deg C	13.2	Semi-annual ground water reports 1998-2004 (see Section 4.0 – References)	15.6	Semi-annual ground water reports 1998-2004 (see Section 4.0 – References)
Depth below grade to water table (and soil thickness)		For commercial/ind buildings: based on average value from annual ground water reports 1998-2004 ( Section 4.0 – Refere		150	For commercial/ industrial buildings: based on average minimum value from semi-annual ground water reports 1998-2004 (see Section 4.0 – References)
	cm	220	For residential buildings: based on minimum depth possible for model (which corresponds to the 55 <sup>th</sup> percentile of average values from semi-annual ground water reports 1998-2004 (see Section 4.0 – References)	220	For residential buildings: based on minimum depth possible for model (which corresponds to the 55 <sup>th</sup> percentile of average values from semi-annual ground water reports 1998-2004 (see Section 4.0 – References)
Soil type	-	loamy sand (LS)	Ebasco, 1991 loamy sand (LS)		Ebasco, 1991
Soil dry bulk density	g/cm <sup>3</sup>	1.62	default based on soil type (EPA 2003)		
Soil total porosity	unitless	0.39	default based on soil type (EPA 2003)	0.45	literature-based value for soil type (Fetter, 1988)
Soil water-filled porosity	cm <sup>3</sup> / cm <sup>3</sup>	0.076	default based on soil type (EPA 2003)	0.049	lower bound based on the soil type (bounded by the soil's effective total fluid saturation property)
<b>Building-related properti</b>	ies				
Enclosed space floor thickness	cm	10	typical/default for building foundation slab (Table 9, EPA 2003)	10	typical/default for building foundation slab (Table 9, EPA 2003)
Soil-building pressure differential	Pa	4	typical default value (Table 7, EPA 2003)	20	upper bound of practical range of values (Table 7, EPA 2003)
Indoor air exchange rate	1/hr	0.5	typical or mean value (Table 9, EPA 2003)	0.1	conservative value (Table 9, EPA 2003)
Typical residential buildin	g				
Depth below grade to bottom of enclosed floor space	cm	200	typical/default for basement construction (Table 9, EPA 2003)	200	typical/default for basement construction (Table 9, EPA 2003)

Table 2-5: Values and Sources for Model Input Parameters for Soil/Ground Water and Building Properties (continued)

Floor-wall seam crack	cm	0.2	typical/default for basement construction (based on crack ratio in Table 9, EPA 2003)	1.0	conservative for basement construction (based on crack ratio in Table 9, EPA 2003)
Widui		1,130	dirt floor scenario based on crack ratio of 1 (Ettinger 2005)	610	dirt floor scenario based on crack ratio of 1 (Ettinger 2005)
Enclosed space floor length	cm	1,130	median value from 80 homes within contaminated ground water area (based on map estimate from total sq ft)	610	minimum value from 80 homes within contaminated ground water area (based on map estimate from total sq ft)
Enclosed space floor width	cm	1,130	median value from 80 homes within contaminated ground water area (based on map estimate from total sq ft)	610	minimum value from 80 homes within contaminated ground water area (based on map estimate from total sq ft)
Enclosed space height	cm	225	median value from 7 homes sampled (EPA 2004)	190	minimum value from 7 homes sampled (EPA 2004)
Typical commercial buildi	ng				
Depth below grade to bottom of enclosed floor space	cm	15	default for slab-on-grade construction (EPA 2003)	15	default for slab-on-grade construction (EPA 2003)
Floor-wall seam crack width	cm	0.75	typical value for slab-on- grade construction (based on crack ratio in Table 9, EPA 2003)	4	conservative for slab-on- grade construction (based on crack ratio in Table 9, EPA 2003)
Enclosed space floor length	cm	1,980	median value from 43 buildings within contaminated ground water area (based on map estimate from total sq ft)	580	minimum value from 43 buildings within contaminated ground water area (based on map estimate from total sq ft)
Enclosed space floor width	cm	1,980	median value from 43 buildings within contaminated ground water area (based on map estimate from total sq ft)	580	minimum value from 43 buildings within contaminated ground water area (based on estimate from total sq ft)
Enclosed space height	cm	244	typical value based on building mixing height for slab-on-grade scenario (Table 9, EPA 2003)	213	conservative value based on building mixing height for slab-on-grade scenario (Table 9, EPA 2003)

<sup>1</sup> The reasonable maximum parameters selected are those that provide the most conservative (i.e., highest) modeled air concentrations.

Table 2-6: Summary of Residential and Commercial/Industrial Structure Sizes

-		
Average	1,489	8,494
Maximum	2,977	77,452
Minimum	390	357
Median	1,386	4,238
Number	80	43

#### 3.0 Tier 1 Ground Water and Indoor Air Screening

Consistent with EPA's vapor intrusion guidance (2002), the evaluation of the potential risk from vapor intrusion follows a multi-tiered approach. Tier 1 Primary Screening consists of screening of chemicals to determine the potential for vapor intrusion, and development of a conceptual site model (CSM). A Tier 1 primary screening has, in effect, already been completed by EPA, as it has already been determined that an indoor air assessment is required. That is, based on the potential at the Site for subsurface vapor intrusion (exceedances of the MCP GW-2 criteria) and based on the detection of TCE in indoor air at concentrations greater than screening levels derived using MADEP methodology (EPA, 2004; MADEP, 1991), as described in Section 2.1, EPA has determined that an indoor air HHRA should be conducted.

To complete the Tier 1 screening, ICF developed a CSM that integrates the available information and specifies the sources, chemicals released, fate and transport mechanisms, potentially exposed populations (i.e., the existence of inhabited buildings located above or in close proximity to subsurface contamination), potential exposure pathways, and routes of exposure (e.g., breathing, ingesting) that the HHRA addresses. The CSM for the indoor air HHRA at the Nyanza site is shown in Figure 3-1.

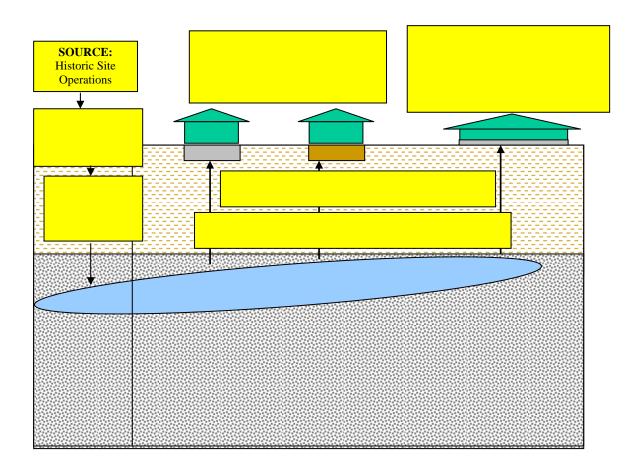


Figure 3-1: Conceptual Site Model for Indoor Air at the Nyanza Site

#### 4.0 Tier 2 Ground Water and Indoor Air Screening

Tier 2 secondary screening consists of screening detected chemicals in ground water and indoor air against generic risk-based criteria to determine if a Tier 3 assessment is necessary. For the Tier 2 screening, ground water data are compared to appropriate screening criteria both to confirm whether a Tier 3 analysis is necessary and to provide support that chemicals of sufficient volatility and toxicity to present potential risks are present in ground water.

The results of the Tier 2 ground water data screening are shown in Tables 4-1 and 4-2. Table 4-1 shows a comparison of the ground water data described in Section 2.2 (both maximum detected concentration, and the arithmetic average concentration calculated using ½ the detection limit for non-detects²) to EPA's target ground water concentrations (TGCs) (EPA, 2002). The TGCs in Table 4-1 are taken from Table 2c in EPA, 2002, and may correspond to: (1) an incremental cancer risk of one in one million (1 x 10<sup>-6</sup>); (2) a noncancer hazard quotient of 0.1 (TGCs based on noncancer effects from Table 2c [EPA, 2002] were revised to a noncancer hazard quotient of 0.1, as per EPA Region I guidance); or (3) an EPA Maximum Contaminant Limit (MCL) (again, as provided in Table 2c [EPA, 2002]). Table 4-2 shows a comparison of the ground water data to the MCP GW-2 criteria (based on volatilization potential to indoor air). The following chemicals exceed the criteria:

#### Exceeded TGCs (Table 4-1):

- 1,2,4-Trichlorobenzene (maximum)
- 1,2-Dichlorobenzene (average and maximum)
- Naphthalene (average and maximum)
- Nitrobenzene (maximum)
- 1,2-Dichloroethene, total (average and maximum)
- Benzene (average and maximum)
- Chlorobenzene (average and maximum)
- cis-1,2-Dichloroethene (average and maximum)
- Methylene chloride (maximum)
- TCE (average and maximum)
- Vinyl chloride (average and maximum)

<sup>&</sup>lt;sup>2</sup> The calculated average may be greater than the maximum, because when there are a limited number of detects, the use of ½ the detection limit for non-detects may elevate the average calculation. Thus, if the average exceeds the TGC, but the maximum detected concentration does not, the chemical is <u>not</u> carried through to the Tier 3 HHRA (for example, for 1,2-dichloroethane, although the average calculated concentration is 18 μg/L, based on the inclusion of ½ the detection limit for non-detects, the single detection out of 110 samples is 0.9 μg/L, and the TGC is 5 μg/L).

Exceeded MCP GW-2 (Table 4-2):

- 1,1-Dichloroethene (average and maximum)
- Chlorobenzene (maximum)
- TCE (average and maximum)
- Vinyl chloride (average and maximum)

Neither EPA TCGs nor MCP GW-2 criteria are available for aniline, p-nitroaniline, or pentachlorophenol. The EPA Draft Subsurface Vapor Intrusion Guidance (EPA, 2002) states that target concentrations for contaminants in indoor air, ground water, and soil gas were developed only for those chemicals that were judged to be sufficiently volatile and toxic to pose an inhalation risk. Both aniline and pentachlorophenol are listed (Table 1, EPA, 2002) as not sufficiently volatile; therefore, EPA did not develop criteria for these chemicals (we assume that the volatility of p-nitroaniline is similar to that of aniline). Based on the EPA guidance, because these chemicals are not sufficiently volatile, they are not constituents of potential concern for the vapor intrusion pathway and do not need to be evaluated further (page 15 and page D-1, EPA, 2002).

The chemicals in ground water that exceed either criterion are carried through to the Tier 3 HHRA.

As described in Section 2.1, actual indoor air data were compared to various criteria by EPA in 1990, 1998, and 2004, and, in each case, EPA determined that additional analysis should be conducted. Even though a Tier 3 HHRA is planned for all detected chemicals in indoor air (in addition to the chemicals that exceed either ground water criterion, as described above), in order to be consistent with the ground water screening, available Site indoor air data (the maximum concentration detected at each sampling location) are compared to the generic target indoor air concentrations provided Table 2c in the EPA (2002) guidance. The EPA criteria used for screening correspond to a cancer risk level of 1 x 10<sup>-6</sup>, or a hazard quotient of 0.1 for noncancer risk. As shown in Table 4-3:

- TCE exceeds its target indoor air concentration (based on a cancer risk of 1 x 10<sup>-6</sup>) at all locations where it was detected.
- Vinyl chloride exceeds its target indoor air concentration (based on a cancer risk of  $1 \times 10^{-6}$ ) at one location.
- Benzene exceeds its target indoor air concentration (based on a cancer risk of 1 x 10<sup>-6</sup>) at all locations where it was detected.
- Chlorobenzene, detected at only one location, does not exceed its target indoor air concentration (based on a noncancer hazard quotient of 0.1).
- 1,4-Dichlorobenzene does not exceed its target indoor air concentration (based on a noncancer hazard quotient of 0.1) at any location.

Although only TCE, vinyl chloride, and benzene exceed their generic target indoor air concentrations (that are based on a cancer risk of 1 x 10<sup>-6</sup>), all five chemicals detected in indoor air are carried through to the Tier 3 analysis.

Table 4-1: Summary of Selected Ground Water Data for Indoor Air Model and Comparison to EPA TGC

					Location	Minimum	Maximum	
01	0-111-	Basis of Criterion	Detection	11-26-	of	Concentration	Concentration	
Chemical	Criteria	(EPA, 2002)	Frequency	Units	Maximum	(Qualifier)	(Qualifier)	Average
Semivolatile Organics	0.40/	Name and all 0.4	00 / 440		NAVA / 000	0.40	500	0.4
1,2,4-Trichlorobenzene	340 ug/L	Noncancer HI=0.1	90 / 110	ug/L	MW-202	0.16 J	530	81
1,2-Dichlorobenzene	260 ug/L	Noncancer HI=0.1	99 / 110	ug/L	MW-115B	0.23 J	2800	700
1,3-Dichlorobenzene	83 ug/L	Noncancer HI=0.1	66 / 110	ug/L	MW-113B	0.6 J	46 J	36
1,4-Dichlorobenzene	820 ug/L	Noncancer HI=0.1	93 / 110	ug/L	MW-115B	0.26 J	500	120
4-Nitroaniline	NA		2 / 110	ug/L	MW-204B	0.19 J	1.2 J	87
Aniline	NA		74 / 107	ug/L	MW-115B	0.14 J	20000	1700
Naphthalene	15 ug/L	Noncancer HI=0.1	42 / 110	ug/L	MW-115B	0.74 J	400 J	66
Nitrobenzene	200 ug/L	Noncancer HI=0.1	36 / 109	ug/L	MW-113B	0.53	2200 J	89
Pentachlorophenol	NA		31 / 110	ug/L	MW-6B	0.036 J	2.2	46
Volatile Organics								
1,1-Dichloroethene	19 ug/L	Noncancer HI=0.1	6 / 110	ug/L	MW-112B	1	13	18
1,2-Dichloroethane	5 ug/L	MCL	1 / 110	ug/L	MW-405B	0.9 J	0.9 J	18
1,2-Dichloroethene (total)	18 ug/L	Noncancer HI=0.1	106 / 108	ug/L	ERT-2	0.89 J	1000	170
2-Butanone	44000 ug/L	Noncancer HI=0.1	2 / 110	ug/L	MW-405B	72 J	90 J	77
Acetone	22000 ug/L	Noncancer HI=0.1	8 / 110	ug/L	MW-115B	2.8 J	780 J	82
Benzene	5 ug/L	MCL	61 / 110	ug/L	MW-6B	0.34 J	120	30
Chlorobenzene	39 ug/L	Noncancer HI=0.1	95 / 110	ug/L	MW-405B	0.92 J	5600	930
Chloroform	80 ug/L	MCL	2 / 110	ug/L	MW-405B	0.32 J	0.6 J	18
cis-1,2-Dichloroethene	21 ug/L	Noncancer HI=0.1	109 / 110	ug/L	ERT-2	0.85 J	1000	160
Ethylbenzene	700 ug/L	MCL	11 / 110	ug/L	MW-6B	1.2 J	8.5 J	18
Methylene chloride	58 ug/L	Cancer Risk=1x10 <sup>-6</sup>	19 / 110	ug/L	MW-115B	1.3 J	70 J	18
Tetrachloroethene	5 ug/L	MCL	4 / 110	ug/L	MW-405B	0.37 J	2	18
Toluene	150 ug/L	Noncancer HI=0.1	5 / 110	ug/L	MW-405B	0.7 J	13	18
trans-1,2-Dichloroethene	18 ug/L	Noncancer HI=0.1	14 / 110	ug/L	MW-6A	1 J	8.6	18
Trichloroethene	5 ug/L	MCL	109 / 110	ug/L	MW-405B	2.5	7600	1300
Vinyl chloride	2 ug/L	MCL	27 / 110	ug/L	MW-304B	0.59 J	46	20
Xylene (o)	3300 ug/L	Noncancer HI=0.1	1 / 76	ug/L	MW-6B	3.8 J	3.8 J	19
Xylenes	2200 ug/L	Noncancer HI=0.1	5 / 108	ug/L	MW-405B	0.7 J	20	19

Criteria = EPA Target Ground Water Concentration (TGC) from Table 2c (EPA, 2002)

Shaded values indicate exceedence of criteria. Average maybe greater than Maximum because 1/2 Detection Limit is used in the calculation (J values included).

U = Not Detected J = Estimated NA = Not Available Average = Arithmetic average

HI = Noncancer hazard index MCL = Maximum Contaminant Level

Table 4-2: Summary of Selected Ground Water Data for Indoor Air Model and Comparison to MCP GW-2

Chemical	Criteria	Detection Frequency	Units	Location of Maximum	Minimum Concentration (Qualifier)	Maximum Concentration (Qualifier)	Average
Semivolatile Organics							
1,2,4-Trichlorobenzene	10000 ug/l	90 / 110	ug/L	MW-202	0.16 J	530	81
1,2-Dichlorobenzene	10000 ug/l	99 / 110	ug/L	MW-115B	0.23 J	2800	700
1,3-Dichlorobenzene	10000 ug/l	66 / 110	ug/L	MW-113B	0.6 J	46 J	36
1,4-Dichlorobenzene	30000 ug/l	93 / 110	ug/L	MW-115B	0.26 J	500	120
4-Nitroaniline	NA	2 / 110	ug/L	MW-204B	0.19 J	1.2 J	87
Aniline	NA	74 / 107	ug/L	MW-115B	0.14 J	20000	1700
Naphthalene	6000 ug/l	42 / 110	ug/L	MW-115B	0.74 J	400 J	66
Nitrobenzene	NA	36 / 109	ug/L	MW-113B	0.53	2200 J	89
Pentachlorophenol	NA	31 / 110	ug/L	MW-6B	0.036 J	2.2	46
Volatile Organics							
1,1-Dichloroethene	1 ug/l	6 / 110	ug/L	MW-112B	1	13	18
1,2-Dichloroethane	20 ug/l	1 / 110	ug/L	MW-405B	0.9 J	0.9 J	18
1,2-Dichloroethene (total)	NA	106 / 108	ug/L	ERT-2	0.89 J	1000	170
2-Butanone	50000 ug/l	2 / 110	ug/L	MW-405B	72 J	90 J	77
Acetone	50000 ug/l	8 / 110	ug/L	MW-115B	2.8 J	780 J	82
Benzene	2000 ug/l	61 / 110	ug/L	MW-6B	0.34 J	120	30
Chlorobenzene	1000 ug/l	95 / 110	ug/L	MW-405B	0.92 J	5600	930
Chloroform	400 ug/l	2 / 110	ug/L	MW-405B	0.32 J	0.6 J	18
cis-1,2-Dichloroethene	30000 ug/l	109 / 110	ug/L	ERT-2	0.85 J	1000	160
Ethylbenzene	30000 ug/l	11 / 110	ug/L	MW-6B	1.2 J	8.5 J	18
Methylene chloride	50000 ug/l	19 / 110	ug/L	MW-115B	1.3 J	70 J	18
Tetrachloroethene	3000 ug/l	4 / 110	ug/L	MW-405B	0.37 J	2	18
Toluene	6000 ug/l	5 / 110	ug/L	MW-405B	0.7 J	13	18
trans-1,2-Dichloroethene	20000 ug/l	14 / 110	ug/L	MW-6A	1 J	8.6	18
Trichloroethene	300 ug/l	109 / 110	ug/L	MW-405B	2.5	7600	1300
Vinyl chloride	2 ug/l	27 / 110	ug/L	MW-304B	0.59 J	46	20
Xylene (o)	NÄ	1 / 76	ug/L	MW-6B	3.8 J	3.8 J	19
Xylenes	6000 ug/l	5 / 108	ug/L	MW-405B	0.7 J	20	19

Criteria = MCP GW-2

Shaded values indicate exceedence of criteria. Average maybe greater than Maximum because 1/2 Detection Limit is used in the calculation (J values included).

U = Not Detected J = Estimated NA = Not Available Average = Arithmetic average

**Table 4-3: Comparison of Maximum Measured Indoor Air Concentrations to Target Air Concentrations** 

Chemical <sup>2</sup>	Target Air		Maxim	um Measur	ed Concen	trations¹ (μ	g/m³)					
- Chichingan	Conc. <sup>4</sup> $(\mu g/m^3)$			F	Residences	;						
		A	В	С	D	E	F	G				
Trichloroethene	0.022											
Vinyl chloride	0.28											
Benzene	0.31											
Chlorobenzene	6											
1,4-Dichlorobenzene <sup>3</sup>	80	0.24										

Chemical <sup>2</sup>	Target Air		Maxin	num Measur	ed Concen	trations¹ (μ	lg/m³)						
Giloinida	Conc. <sup>4</sup> (μg/m <sup>3</sup> )			Re	sidences								
		Н	I	J	К	L	M	N					
Trichloroethene	0.022												
Vinyl chloride	0.28			0.26									
Benzene	0.31												
Chlorobenzene	6	0.46											
1,4-Dichlorobenzene <sup>3</sup>	80	0.06		0.6	2.4	10	0.24						

Chemical <sup>2</sup>	Target Air		Maximum Me	asured Cond	centrations <sup>1</sup> (	μg/m³)	
Chemical	Conc. <sup>4</sup> (μg/m <sup>3</sup> )		Town Hall		Police	e Departme	ent
		Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene	0.022						
Vinyl chloride	0.28						
Benzene	0.31						
Chlorobenzene	6						
1,4-Dichlorobenzene <sup>3</sup>	80	1.1		1.4	1.5	1.4	0.60

<sup>&</sup>lt;sup>1</sup> The maximum concentration detected on any level of the home; blank cells indicate no detects or not analyzed.

<sup>&</sup>lt;sup>2</sup>Only these five chemicals were measured in indoor air.

<sup>&</sup>lt;sup>3</sup> Because 1,4-dichlorobenzene has no target air concentration, the target air concentration for 1,2-dichlorobenzene is used

<sup>&</sup>lt;sup>4</sup> Target air concentration corresponding to a cancer risk of 1 x 10<sup>-6</sup> or a hazard index of 0.1.

Shaded values exceed Target Air Concentration criteria. The full data set (including qualifiers and detection limits) may be found in Table 2-1.

# 5.0 Tier 3 Site-Specific HHRA

Tier 3 is a site-specific inhalation HHRA that consists of:

- Determining chemicals of potential concern,
- Describing exposure scenarios (both current and future),
- Modeling vapor intrusion for ground water contaminants of potential concern,
- Characterizing quantitative risk, and
- Discussing uncertainties.

Two indoor air risk assessments are conducted under this task: (1) one using available measured indoor air data; and (2) one using vapor intrusion modeling of ground water chemicals of potential concern (COPCs).

Using available indoor air data, and exposure parameters and risk equations as provided in the Johnson-Ettinger Users Guide (2003a), an indoor air HHRA is conducted on a building-by-building basis for:

- Fourteen (14) individual residences,
- The Police Department, and
- Two Town Hall locations (one basement and one first floor location).

The inhalation HHRA based on ground water concentrations is conducted using the estimated indoor air concentrations and risk calculations in the Johnson-Ettinger model for the theoretical indoor air exposures in "typical" buildings at the Site (determined as described below in Section 5.2.2). The calculations are done for the chemicals of potential concern in ground water from the selected monitoring well locations for six exposure scenarios that represent potential site-wide exposures and risks and that are assumed to apply to both current and potential future risks. The scenarios include central tendency and reasonable maximum estimates for residential buildings (with below-ground concrete basements and dirt basements) and industrial/commercial buildings (with concrete slab construction).

## 5.1 Determination of Chemicals of Potential Concern

#### 5.1.1 Available Indoor Air Data

For the buildings with available indoor air data, all five contaminants detected in indoor air are used in this HHRA, and are considered COPCs. These include:

- TCE
- Vinyl Chloride
- Benzene
- Chlorobenzene
- 1,4-Dichlorobenzene

#### 5.1.2 Ground Water Data

The ground water contaminants included in Tiers 1 and 2 whose maximum detected concentrations exceed either the EPA (2002) TGC screening levels corresponding to a 1 x 10<sup>-6</sup> cancer risk level and/or a noncancer hazard quotient of 0.1 or MADEP GW-2 criteria, are considered COPCs. The 12 ground water COPCs are:

- 1,2,4-Trichlorobenzene
- 1,2-Dichlorobenzene
- Naphthalene
- Nitrobenzene
- 1,2-Dichloroethene, total
- Benzene
- Chlorobenzene
- cis-1,2-Dichloroethene
- Methylene chloride
- TCE
- Vinyl chloride
- 1,1-Dichloroethene

# 5.2 Determination of Exposure Point Concentrations

Exposure point concentrations are the concentrations that individuals could potentially be exposed to from indoor air.

# 5.2.1 Available Indoor Air Data

For the buildings with available indoor air data, the maximum detected air concentration of each COPC (Table 4-3) at each location is used in the HHRA as the exposure point concentration. If a COPC has not been detected in air at a particular location, it is not included in the assessment of indoor air risks at that location.

# 5.2.2 Ground Water Data and Modeling

For the representative indoor air exposure scenarios, indoor air concentrations were modeled for the central tendency exposure (CTE) scenarios using average site-wide ground water concentrations. For the reasonable maximum exposure (RME) scenarios, the maximum detected ground water concentrations were used. The average and maximum ground water concentrations for each COPC used in the model are summarized in Table 4-1 (with all data listed in Appendix A).

ICF evaluated the vapor intrusion to indoor air pathway from overburden ground water using EPA's Draft *Subsurface Vapor Intrusion Guidance* (EPA, 2002). The Johnson-Ettinger (1991) vapor intrusion model is recommended by this EPA guidance document. This model is recommended for contaminant partitioning and subsurface vapor transport into buildings when a site meets certain criteria (for example, when it is known that volatile chemicals exist in soil or ground water at depths of 100 feet or less). The soil, ground water, or soil gas models

approximate one-dimensional, steady-state vapor transport and can either perform forward- or reverse-risk calculations (i.e., using site-specific soil, ground water, or soil gas concentrations, the model calculates an incremental cancer risk or hazard quotient or reverse-calculates an "acceptable" environmental concentration given a user-defined risk level).

There are six modeled indoor air concentrations, corresponding to the six potential exposure scenarios, and based on the three types of basements in structures near the Site:

- 1. Central tendency residential: below-ground *concrete* basement
- 2. Reasonable maximum residential: below-ground *concrete* basement
- 3. Central tendency residential: below-ground *dirt* basement
- 4. Reasonable maximum residential: below-ground *dirt* basement
- 5. Central tendency industrial/commercial: *concrete slab* construction
- 6. Reasonable maximum industrial/commercial: *concrete slab* construction

For the selected COPCs in ground water, the indoor air exposure point concentrations are modeled for the CTE scenarios using arithmetic average ground water concentrations, while the RME exposure scenarios use the maximum detected ground water concentrations. Data qualified with "J" (estimated) are used and non-detects are included in the averaging calculation at ½ the detection limit.

The advanced Johnson-Ettinger model is used. The advanced model is chosen because it allows more flexibility by providing the user with the ability to enter data for all of the model parameters, thus making the results as site-specific as possible. Site-specific inputs relating to soil type, ground water properties, and building characteristics for the indoor air ground water model are listed in Table 2-5. The parameters listed in Table 2-5 were developed using data from the Nyanza OU II Remedial Investigation (RI) (Ebasco, 1991), the semi-annual ground water monitoring reports, or are based on CADD/GIS base map estimates. If site-specific data are not available, typical or default values provided in the Johnson-Ettinger indoor air model are applied. The reasonable maximum parameters selected are those that provide the most conservative (i.e., highest) modeled air concentrations.

The soil properties presented in Table 2-5 are based on soil boring logs (Ebasco, 1991) from the monitoring wells in the area of interest (Table 2-4). These logs indicate that the dominant soil type in the unsaturated zone consists of silty sands. The soils are classified (using the Unified Soil Classification System) predominantly as SM soils (silty sands, sand-silt mixtures). Based on the available grain size analyses for the Site, the soil type corresponds to loamy sand (approximately 12-25 percent fines), as defined in the Johnson and Ettinger model.

The ground water properties presented in Table 2-5 are based on the data collected during the semi-annual monitoring events performed since 1998. The average annual depth-to-ground water for monitoring wells in the area of interest is approximately 7 feet below ground surface (bgs), with an average minimum depth of approximately 5 feet bgs and an average maximum depth of 8.5 feet bgs. Ground water elevations vary seasonally, with elevations in the wet season (e.g.,

spring) generally 1.5 to 2 feet higher than during the dry season (e.g., summer, fall). Fluctuations in the water table can have a significant impact on the vapor intrusion. Shallow ground water can result in a shorter diffusion travel distance from the water table to a basement, or as recent studies suggest, shallow ground water caused by recent rainfall may correspond to lower indoor air concentrations because the rainfall may form a layer of "clean" water at the top of the water table and reduce the upward diffusion of contaminated vapors.

A limitation of the Johnson and Ettinger model is that the depth to ground water (plus the calculated capillary fringe thickness) cannot be shallower than the depth to the bottom of the enclosed floor space. This limitation is not an issue for the commercial/industrial buildings with slab foundations because the depth to the bottom of the enclosed floor space is sufficiently above the ground water depths. However, for the residential scenarios, the depth to the bottom of the enclosed floor space (i.e., the depth of the basement) is much closer to the ground water table and in some cases would reach or exceed the depth to the ground water (or capillary fringe). Because the model will not run if the bottom of the enclosed floor space is at or below the capillary fringe, the ground water depths for the residential scenarios presented in Table 2-5 are based on depths observed during the semi-annual sampling that correspond to the 55th percentile of the average ground water depth values. That is, the depths used for the residential basement scenarios are slightly deeper than those used for the commercial/industrial concrete slab scenario, in which the ground water depths are based on the average (i.e., 50th percentile) of observed ground water depths. However, the ground water depths used for the residential basement scenarios are still well within the range of average ground water depths found at the Site.

The air concentrations calculated by the Johnson-Ettinger model for each of the six scenarios are presented in Table 5-1. In general, the central tendency indoor air concentrations estimated by the model (based on the average ground water concentrations and using central tendency model parameters) are consistent with the range of measured indoor air concentrations from the 1990, 1998, and 2004 EPA sampling. However, the reasonable maximum indoor air concentrations (using the maximum ground water concentrations and high end, or conservative, inputs into the model) are orders-of-magnitude higher than measured concentrations, as shown in Table 5-2. This difference is because of the very conservative nature of three of the building-related properties used in the vapor intrusion model that change the risk results by more than an order of magnitude between the central tendency and the reasonable maximum scenarios, including the indoor air exchange rate, the floor-wall seam crack width, and the soil-building differential, as discussed in detail in Section 5.7.2. It should be noted that for benzene, however, the highest measured residential indoor air concentration appears to be on the same order of magnitude as the concentration modeled for the reasonable maximum residential concrete basement and industrial/commercial building scenarios. This measured benzene result may be related to the observation of other petroleum products that may emit VOCs in this particular residential basement that was sampled by EPA.

# 5.3 Exposure Scenarios

#### 5.3.1 Available Indoor Air Data

The risks for potential indoor exposures at residences that were sampled and at the Town Hall and Police Department are estimated for two scenarios:

- 1. A central tendency scenario, based on maximum detected indoor air concentrations along with CTE parameters.
- 2. A reasonable maximum scenario, based on maximum detected indoor air concentrations along with RME parameters.

The maximum detected indoor air concentrations are used in both scenarios because there were few (generally three or fewer) samples taken at each location.

The exposure parameters are selected to be consistent with those used in the Johnson-Ettinger model risk calculations for adults, as described in the next section. Many of these exposure parameters were originally published in EPA's *Exposure Factors Handbook* (1997a), where their derivation is described in detail. Exposure parameters are listed in Table 5-3 for the CTE scenario and in Table 5-4 for the RME scenario. Child exposures are not evaluated. For the estimation of cancer risks, the longer exposure duration used to estimate adult exposures results in somewhat higher estimated cancer risks. Estimates of noncancer hazard indices for children could be higher than those calculated for adults, based on the lower body rate and higher inhalation rate.

# 5.3.2 Ground Water Data

There are two representative exposure scenarios for the indoor air concentrations modeled from ground water data in both residential buildings and industrial/commercial facilities, including:

- 1. The CTE scenario, using representative average indoor air model assumptions, CTE parameters (Table 5-3), and the arithmetic mean ground water concentrations.
- 2. The RME scenario, using the most conservative assumptions in the model (e.g., low air exchange rates, shallow depth to ground water, and large cracks in the foundation), upper bound exposure parameters (Table 5-4), and the maximum detected ground water concentrations.

It is noted that our representation of industrial/commercial facilities is a conservative estimate of potential exposures in these types of facilities, because the number of working days per year is usually assumed to be 250 days/year, and workers may only be exposed for about 8 hours per day. Thus, this estimate is also likely to be a sufficient estimate of potential exposures for visitors in municipal buildings, such as the Town Hall and Police Department.

It is assumed that exposures are the same for both current and potential future exposure scenarios.

# 5.4 Calculation of Average Daily Dose

For each contaminant, the average daily dose is calculated as:

$$ADD = \frac{EF \times ED \times C_{building}}{AT \times 365 \, days \, / \, yr}$$

Where:

ADD = Average daily dose (mg/m<sup>3</sup>)

EF = Exposure frequency (days/year)

ED = Exposure duration (years)

C<sub>building</sub> = Vapor concentration in the building (mg/m<sup>3</sup>)

AT = Averaging time for non-carcinogens (AT<sub>NC</sub>) or carcinogens (AT<sub>C</sub>) (years)

# 5.5 Toxicity Assessment

Toxicity values were compiled from EPA's Integrated Risk Information System (IRIS) on-line database and other references, and were submitted to EPA Region I for review. Based on feedback from EPA Region I (EPA Region I, 2005), the toxicity values shown in Tables 5-5 and 5-6 were used in the HHRA. Toxicity values were selected and approved by EPA on the basis of the following recommended hierarchy for site-specific risk assessments (EPA, 2003b):

- Tier 1- EPA's IRIS.
- Tier 2- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs). The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program.
- Tier 3- Other Toxicity Values. Tier 3 includes additional EPA and non-EPA sources of toxicity information, such as EPA's Health Effects Assessment Summary Tables (HEAST) document, which has not been updated since 1997.

Both the previously published EPA TCE inhalation cancer slope factor (1987) of 6.0 x 10<sup>-3</sup> (mg/kg-day)<sup>-1</sup> and EPA's draft (more conservative) high end cancer slope factor of 0.4 (mg/kg-day)<sup>-1</sup> (derived from residential drinking water exposure) (EPA, 2001a) are used to calculate risks from exposure to TCE.<sup>3</sup>

For carcinogenic chemicals without published inhalation toxicity values, inhalation unit risks (URs) are extrapolated from published oral cancer slope factors, using the following equations, as provided in the Johnson-Ettinger Model User's Guide (2003a):

 $<sup>^3</sup>$  In EPA, 2001, several cancer slope factors were developed, with most slope factors falling between  $2\times10^{-2}$  and  $4\times10^{-1}$  per mg/kg-day. EPA considers the presentation of a range to be reasonable in view of the risk factors that can modify the effects of TCE in different populations. This HHRA uses the most conservative of the slope factors presented in the EPA document.

$$UR = CSF \times IR \times \left(\frac{1}{BW}\right) \times 10^{-3}$$

Where:

UR = Unit risk for inhalation  $(\mu g/m^3)^{-1}$ 

 $CSF = Cancer slope factor (mg/kg/day)^{-1}$ 

IR = Inhalation rate for adults  $(m^3/day)$ , assumed to be 20  $m^3/day$ 

BW = Body weight for adults (kg), assumed to be 70 kg

 $10^{-3}$  = conversion from milligrams (mg) to micrograms (µg)

For noncarcinogenic chemicals, reference concentrations (RfCs) are extrapolated from reference doses (RfDs) using the following equation:

$$RfC = RfD \times \left(\frac{1}{IR}\right) \times BW$$

Where:

RfC = Reference concentrations  $(mg/m^3)$ 

RfD = Reference doses (mg/kg/day)

IR = Inhalation rate for adults (m<sup>3</sup>/day), assumed to be 20 m<sup>3</sup>/day

BW = Body weight for adults (kg), assumed to be 70 kg

There are currently no toxicity values available for cis-1,2-dichloroethene. Thus, as directed by EPA Region 1, the potential risks due to exposure to cis-1,2-dichloroethene are discussed qualitatively. In addition, since the majority of the 1,2-dichloroethene detected in ground water at the Nyanza Site is cis-1,2-dichloroethene, the evaluation of total 1,2-dichloroethene is also qualitative.

# 5.6 Risk Characterization

# 5.6.1 Risk Characterization Methodology

In the risk characterization, we calculate estimated incremental risks due to COPCs in indoor air at the Site, for both the available indoor air data and the modeled indoor air data. For residences and buildings with measured indoor air data, Excel spreadsheets are used to calculate risks. For the site-wide modeled ground water vapor intrusion into representative homes and buildings, incremental risks are calculated within the Johnson-Ettinger model.

For each carcinogenic contaminant, the chemical-specific risk level is calculated as:

 $Cancer\ Risk = ADD \times URF$ 

Where:

ADD = Average daily dose (mg/m<sup>3</sup>) URF = Unit risk factor (mg/m<sup>3</sup>)<sup>-1</sup> The inhalation risk results are presented as a sum total of estimated incremental risks from modeled exposures to the carcinogenic COPCs for each of the six exposure scenarios.

Cancer risk estimates are compared to EPA's generally allowable risk limit range, which represents an increased (incremental) risk (or probability) of cancer for an individual potentially exposed to site contaminants, in addition to each individual's baseline cancer risk. The EPA incremental allowable risk limit range is presented in scientific notation as  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ , defined as a risk of cancer for potentially exposed individuals of one in ten thousand to one in one million. In other words, if the estimated cancer risks are within the range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ , then they may be considered acceptable. However, if the risks are higher than  $1 \times 10^{-4}$ , they would be considered unacceptable and would be further evaluated.

For each noncarcinogenic contaminant, the chemical-specific hazard quotient (HQ) is calculated as:

$$Hazard\ Quotient = \frac{ADD}{RfC}$$

Where:

ADD = Average daily dose (mg/m<sup>3</sup>) RfC = Reference concentration (mg/m<sup>3</sup>)

The inhalation risk results are presented as a sum total of hazard quotients (termed a hazard index) for the noncarcinogenic COPCs for each individual exposure location. If the hazard index is less than 1.0, adverse health effects for the exposure are not anticipated.

Because each exposure scenario has the same time frame and receptor, the information required for EPA RAGS Part D, *Standardized Planning, Reporting and Review of Superfund Risk Assessments* (EPA, 2001b) are presented below and are not repeated in each of the risk results tables.

• Scenario Timeframe: Current and future

• Receptor Population: Residents or industrial/commercial workers

• Receptor Age: Adult

• Medium: Ground Water

• Exposure Medium: Indoor Air

• Exposure Point: Inside homes or inside industrial/commercial buildings

• Exposure Route: Inhalation

# 5.6.2 Risk Results - Available Indoor Air Data

Estimated risks for each individual home and commercial location sampled are shown in Tables 5-7, 5-8, 5-9, and 5-10.

# Cancer Risk Estimates

The CTE risk estimates for measured indoor air data (Table 5-7) are within the range considered acceptable by EPA using the 1987 TCE unit risk factor, and range from  $1.1 \times 10^{-6}$  (at the Police Department) to  $4.0 \times 10^{-5}$  (at Location L). Using the draft high end (2001a) TCE unit risk factor, several locations (two residences [G and M] and four town hall areas) are above the range considered acceptable by EPA, with CTE cancer risks ranging from  $1.2 \times 10^{-6}$  (at Location C) to  $5.1 \times 10^{-4}$  (at Location G).

The RME cancer risk estimates (Table 5-8) using the 1987 TCE unit risk factor range from  $3.3 ext{ x}$   $10^{-6}$  (at the Police Department) to  $1.3 ext{ x}$   $10^{-4}$  (at Location L), with all estimated risks within the range considered acceptable by EPA except at Location L. Using the draft high end (2001a) TCE unit risk factor, the majority of the locations are above the range considered acceptable by EPA, with RME cancer risks ranging from  $4.1 ext{ x}$   $10^{-6}$  (at Location C) to  $1.7 ext{ x}$   $10^{-3}$  (at Location G).

For both the CTE and RME scenarios, the following observations are noted:

- Location G has the highest estimated cancer risk (dominated by TCE) estimated using the draft (more conservative) high end TCE unit risk factor (2001a). Location G is situated over a portion of the Nyanza ground water plume that has historically had overburden TCE concentrations of approximately 5,000 μg/L.
- The RME cancer risk estimates (using the draft high end TCE unit risk factor) exceed the range considered acceptable by EPA for residential Locations A, F, G, H, K, L, and M. These locations are situated over a portion of the Nyanza ground water plume that has historically had overburden TCE concentrations generally greater than 1,000 µg/L. The basement properties of these locations (Table 2-2) include a range of concrete block, fieldstone, rock, concrete slab, and earth construction.
- The Town Hall CTE and RME cancer risk estimates using the draft high end TCE unit risk are all above the range considered acceptable by EPA, except for the ambient air samples, and are in the range of  $1.1 \times 10^{-4}$  to about  $7.2 \times 10^{-4}$ .
- The Police Department cancer risk estimates are all within the range considered acceptable by EPA.
- Except for Location L, the majority of all estimated cancer risks are associated primarily with TCE, particularly when risks are calculated using the draft (more conservative) slope factor for TCE.

### Noncancer Risk Estimates

Because the only difference between the CTE scenario (Table 5-9) and the RME scenario (Table 5-10) in the noncancer risk calculation is the exposure duration, which changes in both the numerator and the denominator, the results are the same for both scenarios.

- Benzene at Location L exceeds a hazard quotient of one (1.3). Otherwise, no individual chemical concentration measured in air exceeds a hazard quotient of one.
- The total hazard index for Location L is 1.4, based primarily on benzene. The basement at this location was noted to have a rock foundation with a concrete slab, and also storage of

- petroleum products that could contribute to increased air concentrations of VOCs (particularly benzene).
- The total hazard index for Location G is equal to one, combining the hazard quotients of 0.9 for TCE and 0.1 for benzene. Location G is situated over a portion of the Nyanza ground water plume that has historically had overburden TCE concentrations of approximately 5,000 µg/L. Basement properties were not available for Location G in the EPA reports.

Although a sum total of hazard quotients by target organ is often displayed, that approach is difficult to present in this case, as the toxicity values are based on a wide variety of endpoints (see Section 5.5). In addition, most of the indoor air hazard indices are dominated by two of the measured chemicals (i.e., TCE and benzene).

# 5.6.3 Risk Results – Modeled Indoor Air Concentrations

Estimated risks for each of the modeled indoor air scenarios (residential below ground concrete basement, residential below ground dirt basement, and industrial/commercial concrete slab) are shown in Tables 5-11, 5-12, 5-13, and 5-14.

### Cancer Risk Estimates

Cancer risks are estimated using both the previously published TCE unit risk factor (EPA, 1987) and the draft high end TCE unit risk factor (EPA, 2001a) that is a more conservative estimate of carcinogenic risk.

The estimated CTE cancer risks calculated using the 1987 TCE inhalation unit risk factor range from  $2.7 \times 10^{-6}$  (industrial/commercial concrete slab) to  $4.3 \times 10^{-5}$  (residential dirt basement) (top of Table 5-11) and are all within the range considered acceptable by EPA. However, using the draft TCE unit risk factor (2001a), the residential dirt basement, residential concrete, and industrial/commercial concrete slab scenarios result in CTE cancer risks of  $2.0 \times 10^{-3}$ ,  $1.8 \times 10^{-4}$ , and  $1.3 \times 10^{-4}$ , respectively (bottom of Table 5-11), all of which exceed EPA's acceptable incremental risk range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$ . These CTE risks are driven primarily by TCE.

The estimated RME cancer risks exceed the upper limit of EPA's acceptable risk range for the residential dirt basement, residential concrete, and industrial/commercial concrete slab scenarios. Using the 1987 TCE inhalation unit risk factor (top of Table 5-12), the estimated incremental cancer risks range from 3.4 x 10<sup>-3</sup> (industrial/commercial concrete slab) to 2.6 x 10<sup>-2</sup> (residential dirt basement). Using the more conservative draft unit risk factor for TCE (2001a), the estimated RME cancer risks range from 1.9 x 10<sup>-1</sup> (industrial/commercial concrete slab) to 1.4 (residential dirt basement) (bottom of Table 5-12). It should be noted that a cancer risk exceeding one is not actually possible, and is an artifact of the very conservative nature of the physical properties selected for input into the model for the reasonable maximum indoor air concentrations and the conservative nature of the draft high end TCE unit risk factor (see discussion in Section 5.7).

# Noncancer Risk Estimates

For the CTE scenarios, only the hazard index for the residential dirt basement scenario exceeds one (Table 5-13). For this scenario, the calculated hazard index is 5.7, based primarily on TCE and chlorobenzene. Although a sum total of hazard quotients by target organ is often displayed, the toxicity values are based on a wide variety of endpoints (Section 5.5). In addition, the hazard indices are dominated by just two chemicals (TCE and chlorobenzene); TCE has noncancer toxicity endpoints including central nervous system, liver, and endocrine system effects<sup>4</sup>.

For the RME scenarios (Table 5-14), which use more conservative inputs in the vapor intrusion model, hazard indices for all scenarios exceed one, with the residential dirt basement resulting in the highest hazard index (HI = 1,184), and residential concrete basement and industrial/commercial concrete slab hazard indices of 235 and 210, respectively. For all scenarios, chlorobenzene (hazard quotients from 62 to 346) and TCE (hazard quotients from 134 to 750) dominate the hazard index results. In addition, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, naphthalene, nitrobenzene, benzene, and vinyl chloride have calculated hazard quotients greater than one (hazard quotients ranging from approximately 2 to 25).

#### 5.6.4 Risk Characterization Conclusions

### Measured Indoor Air Concentrations

For measured indoor air concentrations:

- The CTE cancer risk estimates using the previous (EPA, 1987) TCE unit risk factor are within the range considered acceptable by EPA (1 x10<sup>-6</sup> to 1 x 10<sup>-4</sup>), while several locations (Locations G and M, and Town Hall) exceed a cancer risk of 1 x 10<sup>-4</sup>, using the high end unit risk factor for TCE (EPA, 2001a).
- The highest RME cancer risk estimate for measured indoor air data is 1.7 x 10<sup>-3</sup>, for Location G, using the high end TCE unit risk factor. Location G is situated over a portion of the Nyanza ground water plume that has historically had overburden TCE concentrations of approximately 5,000 µg/L.
- The locations with estimated cancer risks exceeding 1 x 10<sup>-4</sup> for the RME scenario include Locations A, F, G, H, K, L, M, and the Town Hall. TCE represents the majority of all calculated risks, particularly when using the draft (more conservative) high end unit risk factor for TCE. These locations are situated over a portion of the Nyanza ground water plume that has historically had overburden TCE concentrations generally greater than 1,000 μg/L. The basement properties of these locations vary.
- The Police Department cancer risk estimates are all within the range considered acceptable by EPA.
- For both CTE and RME scenarios, only residential Location L had a hazard index that slightly exceeds one, primarily due to benzene. This location was noted to have petroleum products stored in the basement that could contribute to increased air concentrations of VOCs.

<sup>&</sup>lt;sup>4</sup> The toxicity value for chlorobenzene was provided by EPA, and the toxicity endpoints used as the basis of the noncancer toxicity value were not provided.

### Modeled Indoor Air Concentrations

For the indoor air concentrations modeled using the Johnson-Ettinger model:

- Using the 1987 TCE cancer unit risk factor, the modeled CTE cancer risk estimates are within EPA's acceptable incremental cancer risk range (ranging from 2.7 x 10<sup>-6</sup> to 4.3 x 10<sup>-5</sup>) for the residential dirt basement, residential concrete, and industrial/commercial concrete slab scenarios.
- Using the draft high end unit risk factor for TCE (2001a), the modeled CTE risk estimates exceed EPA's acceptable cancer risk range (ranging from 1.3 x 10<sup>-4</sup> to 2.0 x 10<sup>-3</sup>, dominated by TCE) for the residential dirt basement, residential concrete, and industrial/commercial concrete slab scenarios.
- RME cancer risks calculated using the 1987 TCE unit risk factor exceed the acceptable EPA incremental cancer risk range (ranging from 3.4 x 10<sup>-3</sup> to 2.6 x 10<sup>-2</sup>).
- Using the draft high end unit risk factor for TCE (2001a), estimated cancer risks for the RME scenarios are very high, ranging from 1.9 x 10<sup>-1</sup> to 1.4. As discussed above, a cancer risk exceeding one is not actually possible, and is an artifact of the very conservative nature of the physical properties selected for input into the model for the reasonable maximum indoor air concentrations and the conservative nature of the draft high end TCE unit risk factor (see discussion in Section 5.7). The conclusion that the modeled RME cancer risk estimates of indoor air concentrations are likely to be over-estimates is supported by the fact that the modeled central tendency indoor air concentrations were consistent with measured indoor air concentrations, while the modeled reasonable maximum indoor air concentrations are orders-of-magnitude higher than measured concentrations. In addition, the conservative nature of the draft TCE unit risk factor strongly influences the high estimates of risk for the RME scenario. These, and additional uncertainties, are discussed in Section 5.7.
- Hazard indices exceed one in the CTE risk estimates only for the residential dirt basement scenario (HI = 5.7). For the RME scenarios, hazard indices for all scenarios exceed one, with the residential dirt basement resulting in the highest total hazard index (HI = 1,184).

# 5.6.5 Back-Calculated Ground Water Concentrations

In order to provide perspective on the ground water TCE concentrations at the Nyanza Site that correspond to unacceptable noncancer and cancer risks, a reverse calculation was performed using the Johnson-Ettinger model. The model was run using the high end draft TCE unit risk factor (EPA, 2001a), as well as the site-specific CTE and RME soil/ground water/basement properties identified in Table 2-5 and discussed in Section 2. Table 5-15 provides the risk-based TCE ground water concentrations that correspond to a 1 x 10<sup>-4</sup> cancer risk and a hazard index of 1 for noncancer health effects.

# 5.7 Uncertainty Discussion

This section describes the uncertainties associated with the estimation of potential cancer and noncancer risks. Each step of the HHRA has associated uncertainties, although in general, conservative assumptions are used. Thus, the risk calculations are assumed to protect even the most sensitive populations.

The general uncertainties and limitations associated with the HHRA include: measured and modeled data, exposure parameters, toxicity values, and risk characterization.

# 5.7.1 Data – Measured Indoor Air Concentrations

The available measured indoor air concentrations were limited. Some of the homes were sampled during each of the three sampling events, but several of the homes had data from only one or two of the sampling events. In 2004, 24-hour samples were taken (EPA, 2004). However, in 1990 (EPA, 1990) and 1998 (EPA, 1998), grab samples, identified in the 1998 report as "a sample that is collected for approximately two minutes," were taken. Thus, the indoor air samples are only "snapshots" of potential exposures to the chemicals of concern, rather than a comprehensive picture of potential long-term exposures. This uncertainty may have a moderate effect on the magnitude of the risk estimate, but the direction of the bias is unknown.

The data collection techniques and quality control data such as method blank results, spike sample recoveries, field blanks and duplicates, and surrogate recoveries were not reviewed by ICF. These results may have affected the data used in the HHRA, for example, if a chemical was detected in laboratory blanks, it may not have been used in the HHRA. In addition, the differences in detection limits and detected concentrations between initial sampling and subsequent sampling adds some uncertainty. The detection limits used in the earliest round of indoor air sampling (1990) were much higher than those used in subsequent sampling rounds.

In some cases, items that may emit VOCs into air were observed in residential basements. These items, such as lawnmowers, paint cans, and gasoline, could result in overestimates of basement VOC air concentrations, and subsequent overestimation of risks due to vapor intrusion from contaminated ground water.

#### 5.7.2 Data – Modeled Indoor Air Concentrations

As discussed in Section 2.2, the 22 selected wells with available ground water data for the years 1998-2004 provide good spatial coverage over the entire contaminant plume area. Additionally, the 22 selected wells have screened interval depths that are applicable to a vapor intrusion assessment – most of the screened intervals are less than 25 feet deep. Thus, these factors contribute minimal uncertainty to the HHRA.

The soil, ground water, and building-related properties used for modeling are selected first based on site-specific information and then using default values derived for the Johnson-Ettinger model (EPA, 2003). For the soil and ground water properties, the uncertainty for this Site is reduced because many of the inputs are based on site-specific information, such as the soil type and depth below grade to the water table. There is some uncertainty associated with the soil type that was used for the one layer modeled at the Site; however, since the two most common types of soil at the shallower depths at the Site were loamy sand and sandy loam (as determined from the soil boring logs), the soil properties such as porosity do not vary much and thus are not expected to add significantly to the uncertainty for these parameters. On the other hand, for the building-related properties, only the inputs related to building size are based on site-specific values from homes within the contaminated ground water area. Many of the model inputs are based on

typical, default, or conservative values for each of the building types. Most of the variations in inputs between the CTE and RME scenarios do not lead to large variations in the model results. However, three of the building-related properties change the risk results by more than an order-of-magnitude between the CTE and RME scenarios. These three properties include: the indoor air exchange rate, the floor-wall seam crack width, and the soil-building pressure differential. Each of these inputs is discussed in more detail below.

- The indoor air exchange rate is used to calculate the building ventilation rate. The default value is 0.25/hr, which is consistent with the 10th percentile of houses in all regions of the U.S., the typical or mean value is 0.5/hr, and the conservative value is 0.1/hr (EPA, 2003). For this Site, the typical value is used for the central tendency scenario and the conservative value is used for the reasonable maximum scenario, but there is no site-specific information to verify whether these values are similar to those seen in local homes.
- The soil-building pressure differential creates a flow of soil gas through the soil matrix and into the structure through cracks, gaps, and openings in the foundation and typical values are in units called pascals (Pa), and are generally 4 or 5 Pa, with individual average values approximately 2 Pa, and a typical range of 0 to 15 Pa (EPA, 2003). Thus, the maximum of the effective range of values for this parameter of 20 Pa, which is used for the reasonable maximum scenario, is a highly conservative value. Similar to the indoor exchange rate, using the high end of this input is likely introducing uncertainty into the risk values since site-specific information is not available to verify their appropriateness at the Site.
- For the floor-wall seam crack width, a gap is assumed to exist at the junction between the floor and the foundation along the perimeter of the floor and it is assumed to be the only opening in the understructure of the house and therefore the only route for soil gas entry. Based on typical open areas reported (EPA, 2003), the default value of the floor-wall seam crack width is 0.1 cm and conservative and typical building crack ratios are approximately 0.001 and 0.0002, respectively. These ratios are used to calculate crack widths for residential basements and commercial buildings, but they are uncertain because foundation cracks are specific to each building and are likely to vary widely based on the age of the house, previous sightings of water in the basement (which has occurred at some of the local residential homes and would likely increase the width of cracks), whether the basement is finished or otherwise maintained, and other factors that are unknown for the buildings at the Site.

Thus, because of the conservative nature of the model inputs, the estimated reasonable maximum indoor air concentrations are likely to be over-estimates (as discussed in Sections 5.6.3 and 5.6.4). The conclusion that the RME estimates of indoor air concentrations are likely to be over-estimates is supported by the fact that the central tendency indoor air concentrations estimated by the model were generally consistent with measured indoor air concentrations (as shown in Table

5-2), while the reasonable maximum indoor air concentrations were orders-of-magnitude higher than measured concentrations.

In addition, available ambient and indoor air background data for anthropogenic chemicals was qualitatively compared to the measured EPA indoor air data. As discussed previously, ambient (outdoor) air data, that may be considered a site-specific background data set, were collected by EPA from three locations during the 1990, 1998, and 2004 sampling events. In addition, indoor air concentrations available in Kurtz and Folkes (2002) were reviewed.

The ambient concentrations for TCE were measured at concentrations up to 0.49 ppb/v, while vinyl chloride was not detected. Benzene was detected at concentrations up to 0.8 ppb/v in ambient air, and one detect of 1,4-dichlorobenzene at 0.23 ppb/v.

The measured indoor air concentrations of TCE and vinyl chloride are compared to those published by Kurtz and Folkes (2002). For both chemicals, measured concentrations exceed the published median and the geometric mean concentrations. Furthermore, the maximum measured TCE concentration (range of 0.54 to 37.6  $\mu$ g/m³) at the Nyanza Site exceeds the maximum published concentration (27  $\mu$ g/m³); while the maximum measured concentration of vinyl chloride (range of 0.26 to 0.51  $\mu$ g/m³) at the Nyanza Site is closer to the maximum measured by Kurtz and Folkes (0.5  $\mu$ g/m³). However, 59 percent of the Nyanza measurements are reported as non-detects (i.e., below detection limits), and these detection limits are higher than many of the published values. Thus, it is uncertain how many of the reported "non-detect" measurements are actually below the published concentrations.

# 5.7.3 Exposure Parameters

Each of the exposure parameters required for quantification of risks actually represents a range of values. The use of regulatory guidelines in determining exposure assumptions introduces uncertainty into the HHRA. For example, the RME duration, as required by EPA for the residential scenario, is assumed to be 30 years. Individuals may live in the area for shorter or longer time periods. This assumption could over-estimate or under-estimate the actual frequency of exposure to indoor air, leading to either an over-estimation or under-estimation of risks. Child exposures are not evaluated. For the estimation of cancer risks, the longer exposure duration used to estimate adult exposures results in somewhat higher estimated cancer risks. Estimates of noncancer hazard indices for children could be higher than those calculated for adults, based on the lower body rate and higher inhalation rate.

EPA (2002) recommends consideration of non-residential, non-working exposures. This could include buildings where the general public may be present, e.g., schools, libraries, hospitals, hotels, and stores. This HHRA does not explicitly consider these potential exposures, however, the industrial/commercial exposure estimates are likely conservative estimates of potential non-residential, non-working exposures that could be occurring in locations in the Nyanza plume area (e.g., small business and retail stores).

# 5.7.4 Toxicity Values

In general, uncertainties are inherent in toxicity evaluations. First, the toxicity data from animal studies is developed in high dosage animal studies. The estimated human intakes associated with residences are proportionally many times lower than would cause any observable effects in laboratory cancer studies. In addition, there are inter-species differences in uptake, metabolism, and distribution of chemicals, as well as differences in target site (e.g., tissues and organs) susceptibility. The 95th percentile upper confidence limit slope from laboratory animal cancer studies is used as the cancer slope factor, resulting in a conservative estimate of the uppermost bounds of the potential risks.

In the case of the draft unit risk factor for TCE, this HHRA uses the high end of the range of values presented in EPA, 2001a. The appropriate measure of risk for TCE may lie anywhere within that range. This is a conservative approach for the assessment of risk associated with inhalation exposures to TCE, likely resulting in an overestimate of the cancer risks associated with TCE in indoor air.

Toxicity values are not available for total-1,2-dichloroethene or cis-1,2-dichloroethene. The lack of quantification of the risks associated with these compounds may result in an underestimate of the potential risks. Cis-1,2-dichloroethene was detected in a larger majority of samples (109/111) than trans-1,2-dichloroethene (14/110), and at higher concentrations. Cis-1,2-dichloroethene concentrations ranged from 0.85 to 1000  $\mu$ g/L, and exceeded the TGC (21  $\mu$ g/L, corresponding to a noncancer hazard quotient of 0.1), while trans-1,2-dichloroethene concentrations ranged from 1 to 8.6  $\mu$ g/L, and do not exceed the TGC (18  $\mu$ g/L).

The modeled indoor air concentrations of total-1,2-dichloroethene are compared to an Agency for Toxic Substance and Disease Registry (ATSDR) acute and intermediate Minimal Risk Level  $(MRL)^5$  of 0.2 ppm  $(790 \,\mu\text{g/m}^3)$ . The modeled indoor air concentrations of total-1,2-dichloroethene range from 2 to 17  $\mu\text{g/m}^3$  for the CTE scenarios, and range from 749 to 3641 for the RME scenarios. Thus, the CTE modeled indoor air concentrations are well below the MRL, while the modeled RME indoor air values exceed the MRL.

# 5.7.5 Risk Characterization

There is uncertainty in assessing the toxicity of a mixture of chemicals, as is typically found in a contaminated site. In this HHRA, potential toxic effects resulting from exposure to each chemical are calculated and reported separately by chemical. This approach does not take into account interactions between chemicals in a mixture, which may result in effects greater or less than expected, however, data on these synergistic or antagonistic interactions are limited.

<sup>&</sup>lt;sup>5</sup> Minimal Risk Level -- An estimate of daily human exposure to a dose of a chemical that is likely to be without an appreciable risk of adverse noncancer effects over a specified duration of exposure.

Table 5-1: Air Concentrations Estimated From Johnson-Ettinger Model

				hase Concent the Building (		9
Contaminants of Potential Concern		al Concrete ement		ential Dirt ement		I/Commercial rete Slab
	Average	Maximum	Average	Maximum	Average	Maximum
1,2,4-Trichlorobenzene	0.06	28	0.6	98	0.06	27
1,2-Dichlorobenzene	1	327	12	1600	1	401
Naphthalene	0.02	10	0.4	51	0.03	13
Nitrobenzene	0.002	4	0.3	51	0.002	7
1,1-Dichloroethene	0.4	33	5	173	0.5	43
Benzene	0.2	58	2	304	0.2	75
Chlorobenzene	3	1460	34	7220	4	1810
Methylene chloride	0.05	16	0.7	86	0.07	21
Trichloroethene	13	6204	146	31300	17	7810
Vinyl chloride	0.8	146	10	803	1	196
Trans 1,2-dichloroethene	0.08	6	0.9	31	0.1	8
Cis 1,2-dichloroethene	0.6	324	7	1607	0.8	402
Total 1,2 dichloroethene <sup>1</sup>	2	749	17	3641	2	917

Notes:

1 Modeled using chemical properties for trans-1,2-dichloroethene because those properties are not available for total 1,2-

Table 5-2: Comparison of Highest Measured Indoor Air Concentrations and Modeled Air Concentrations

	Highest Measured	Air C	Concent		Modeled f ata (μg/m³	rom Groun )	d Water
Chemicals	Indoor Air Concentrations		Average	1		Maximum <sup>2</sup>	
	(μg/m³)	RC	IC	RD	RC	IC	RD
Trichloroethene	38	13	17	146	6204	7810	31300
Vinyl chloride	0.5	0.8	1	10	146	196	803
Benzene	42	0.2	0.2	2	58	75	304
Chlorobenzene	0.46	3	4	34	1460	1810	7220
1,4- Dichlorobenzene <sup>3</sup>	10	1	1	12	327	401	1600

<sup>&</sup>lt;sup>1</sup> The estimated model concentrations shown are based on the average ground water concentrations for residential concrete (RC) basements, industrial/commercial (IC) buildings, and residential dirt (RD) basements, respectively.

<sup>&</sup>lt;sup>2</sup> The estimated model concentrations shown are based on the maximum ground water concentrations for residential concrete (RC) basements, industrial/commercial (IC) buildings, and residential dirt (RD) basements, respectively.

<sup>&</sup>lt;sup>3</sup> 1,4-dichlorobenzene was measured in indoor air. Since, in ground water, 1,4-dichlorobenzene did not exceed its TGC, the air concentrations modeled from ground water shown here for comparison purposes are for 1,2-dichlorobenzene.

Table 5-3: Inputs for Daily Intake Calculations - Central Tendency

		Residentia	al Scenarios²	2	Ind	ustrial/Comr	nercial Scen	arios²		
Exposure Route		Inh	alation			Inh	alation			
Receptor Population		Re	sident			Industrial/ Co	mmercial Worl	ker		
Receptor Age <sup>1</sup>		A	dult			A	dult			
Exposure Point	transferred transferred	to air (the expo	vater (the mediosure medium) sion through s	and	transferred transferred	to air (the expo	vater (the mediosure medium) usion through s	and		
Parameter Code	ED	EF	$AT_{NC}$	$AT_{C}$	ED	EF	AT <sub>NC</sub>	$AT_{\rm C}$		
Parameter Definition	Exposure Duration	Exposure Frequency	Averaging Time – Non- carcinogen	Averaging Time - Carcinogen	Exposure Duration	Exposure Frequency	Averaging Time – Non- carcinogen	Averaging Time - Carcinogen		
Value	9	350	9	70	7 250 7 70					
Units	years	days/year	years	years	years	days/year	years	years		
Rationale/ Reference	average length of time living in one location in the U.S.	all days spent in home, except for 2 weeks vacation	equal to exposure duration	average lifetime	average length of time in one job in the U.S.	number of working days per year	equal to exposure duration	average lifetime		
Intake Equation/ Model Name	1	$EF \times ED \times C$ $AT \times 365 \alpha$					Conc. in Ai 55 days / yr	<u>r</u>		

- 1. Child exposures are not evaluated, as discussed in the text.
- 2. Common Scenario Characteristics:
  - o Scenario Timeframe: Current and Future
  - o Medium: Ground Water
  - o Exposure Medium: Air

Table 5-4: Inputs for Daily Intake Calculations – Reasonable Maximum

		Residentia	al Scenarios		Ind	ustrial/Comr	mercial Scen	arios		
Exposure Route		Inha	alation			Inha	alation			
Receptor Population		Res	sident		]	Industrial/ Cor	nmercial Work	cer		
Receptor Age <sup>1</sup>		A	dult			A	dult			
Exposure Point	transferred t	o air (the expo via vapor intru	vater (the medionsure medium) sion through so	and	transferred t	to air (the expo via vapor intru	vater (the mediosure medium) sion through so	and		
Parameter Code	ED	EF	$AT_{NC}$	$AT_{C}$	ED	EF	$AT_{NC}$	$AT_{C}$		
Parameter Definition	Exposure Duration	Exposure Frequency	Averaging Time – Non- carcinogen	Averaging Time - Carcinogen	Exposure Duration	Exposure Frequency	Averaging Time – Non- carcinogen	Averaging Time - Carcinogen		
Value	30	350	30	70	22 250 22 70					
Units	years	days/year	years	years	years	days/year	years	years		
Rationale/ Reference	reasonable maximum length of time living in one location in the U.S.	all days spent in home, except for 2 weeks vacation	equal to exposure duration	average lifetime	reasonable maximum length of time in one job in the U.S.	number of working days per year	equal to exposure duration	average lifetime		
Intake Equation/ Model Name	EF		ncentration i 65 days / yr	n Air	<u>EF</u>		centration ir 5 days / yr	ı Air		

- 1. Child exposures are not evaluated, as discussed in the text.
- 2. Common Scenario Characteristics:
  - o Scenario Timeframe: Current and Future
  - Medium: Ground WaterExposure Medium: Air

Table 5-5: Cancer Toxicity Data – Inhalation

Chemicals of Potential	Unit F	Risk	Inhalation Slope F		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhala	ation CSF
	Value	Units	Value	Units	(Current Guidelines, EPA, 1986)	Source(s)	Date(s)
1,2,4-Trichlorobenzene			NA	NA			
1,2-Dichlorobenzene							
1,4-Dichlorobenzene							
Naphthalene							
Nitrobenzene							
1,1-Dichloroethene							
Benzene	7.8E-06	$(\mu g/m^3)^{-1}$			A/Known Human Carcinogen	IRIS	Last Updated 4/17/03
Chlorobenzene							
Methylene chloride	4.7E-07	$(\mu g/m^3)^{-1}$			B2/Probable Human Carcinogen	IRIS	Last Updated 7/30/03
Trichloroethene (1987) <sup>1</sup>	1.7E-06	$(\mu g/m^3)^{-1}$			B1/Probable Human Carcinogen.	Inhalation SF (EPA, 1987)/Extrapolated <sup>1</sup>	1987
Trichloroethene (draft 2001a) <sup>1</sup>	1.1E-04	$(\mu g/m^3)^{-1}$			B1/Probable Human Carcinogen.	Oral SF from EPA (2001a)/Extrapolated <sup>1</sup>	EPA, 2001a
Vinyl chloride	8.8E-06	$(\mu g/m^3)^{-1}$			A/Known Human Carcinogen	IRIS <sup>2</sup>	Last Updated 10/28/03

Extrapolated = as discussed in Section 5.5 of the report text.

<sup>-- =</sup> chemical not carcinogenic or no cancer toxicity values available

<sup>1.</sup> For TCE, both the 1987 inhalation CSF of  $6.0 \times 10^{-3} \text{ (mg/kg-day)}^{-1}$  and the high end draft 2001 CSF of  $0.4 \text{ (mg/kg-day)}^{-1}$  are used to extrapolate the inhalation unit risks in this table.

<sup>2.</sup> For "Continuous lifetime exposure from birth."

IRIS = EPA's on-line Integrated Risk Information System

Table 5-6: Noncancer Toxicity Data – Inhalation

Chemicals of	Chronic/ Sub-	Inhalatio	n RfC	Extrap Rf		Primary	Combined Uncertainty	RfC : Target	Organ(s)
Potential Concern	chronic	Value	Units	Value	Units	Target Organ(s)	/Modifying Factors	Source(s)	Date(s)
1,2,4- Trichlorobenzene	Chronic	4.00E-03	mg/m <sup>3</sup>	NA	NA	(1)	(1)	PPRTV	
1,2- Dichlorobenzene	Chronic	3.15E-01	mg/m <sup>3</sup>			No adverse effects	1000	Oral RfD from IRIS/ Extrapolated	
1,4- Dichlorobenzene	Chronic	8.00E-01	mg/m <sup>3</sup>			Liver	100	IRIS	Last Updated 1/12/00
Naphthalene	Chronic	3.00E-03	mg/m <sup>3</sup>			Nasal effects	300	IRIS	Last Updated 1/9/02
Nitrobenzene	Chronic	2.00E-03	mg/m <sup>3</sup>			(1)	(1)	HEAST	
1,1-Dichloroethene	Chronic	2.00E-01	mg/m <sup>3</sup>			Liver	30	IRIS	Last Updated 10/28/03
Benzene	Chronic	3.00E-02	mg/m <sup>3</sup>			Decreased lymphocytes	300	IRIS	Last Updated 4/17/03
Chlorobenzene	Chronic	2.00E-02	mg/m <sup>3</sup>			(1)	(1)	HEAST	
Methylene chloride	Chronic	3.00E+00	mg/m <sup>3</sup>			(1)	(1)	HEAST	
Trichloroethene	Chronic	4.00E-02	mg/m <sup>3</sup>			Liver, CNS, endocrine	1000	EPA 2001a	
Vinyl chloride	Chronic	1.00E-01	mg/m <sup>3</sup>			Liver	30	IRIS	Last Updated 10/28/03

PPRTV = Provisional Peer Reviewed Toxicity Values – The Office of Research and Development/National Center for Environmental Assessment/Superfund Health Risk Technical Support Center develops PPRTVs on a chemical-specific basis when requested by EPA's Superfund program.

IRIS = EPA's on-line Integrated Risk Information System

HEAST = From Health Effects Assessment Summary Tables (EPA, 1997), as provided by EPA

Extrapolated = as discussed in Section 5.

(1) Values provided by Superfund Technical Support Center to EPA Region 1; background information on these values not provided.

Table 5-7: Cancer Risk Results - Available Indoor Air Data - Central Tendency Scenario

									(	Cancer R	lisk							
Chemical of Potential					Res	sidences	1							Tow	n Hall			Police Dept.
Concern <sup>3</sup>	A	В	С	D	E	F	G	н	J	К	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene (1987) <sup>2</sup>	1.1E-06					1.1E-06	7.9E-06	1.0E-06	2.2E-07	1.1E-06	3.4E-07	2.1E-06	3.5E-06	1.8E-06	2.0E-06	1.8E-06	4.3E-07	8.8E-08
Vinyl chloride									2.8E-07	5.5E-07								
Benzene	1.3E-06	2.1E-06	1.2E-06	3.1E-06	9.2E-06	9.2E-06	3.1E-06	1.5E-06	1.5E-06	1.5E-06	4.0E-05	1.2E-05	2.4E-06		9.6E-07	9.6E-07	6.7E-07	9.6E-07
Total Cancer Risk for Each Location (using 1987 TCE CSF)	2.4E-06	2.1E-06	1.2E-06	3.1E-06	9.2E-06	1.0E-05	1.1E-05	2.6E-06	2.0E-06	3.2E-06	4.0E-05	1.4E-05	5.9E-06	1.8E-06	3.0E-06	2.7E-06	1.1E-06	1.1E-06

					Re	sidences	,1							Tow	n Hall			Police Dept.
Chemical of Potential Concern <sup>3</sup>	A	В	С	D	E	F	G	н	J	к	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene (draft 2001a) <sup>2</sup>	7.3E-05					7.3E-05		6.6E-05	1.5E-05	7.3E-05	2.2E-05						2.8E-05	5.7E-06
Vinyl chloride									2.8E-07	5.5E-07								
Benzene	1.3E-06	2.1E-06	1.2E-06	3.1E-06	9.2E-06	9.2E-06	3.1E-06	1.5E-06	1.5E-06	1.5E-06	4.0E-05	1.2E-05	2.4E-06		9.6E-07	9.6E-07	6.7E-07	9.6E-07
Total Cancer Risk for Each Location (using draft high end 2001 TCE CSF)	7.4E-05	2.1E-06	1.2E-06	3.1E-06	9.2E-06	8.2E-05		6.7E-05	1.6E-05	7.5E-05	6.2E-05						2.8E-05	6.7E-06

<sup>&</sup>lt;sup>1</sup> No detects for Residences at Locations I and N.

<sup>&</sup>lt;sup>2</sup> For TCE, both the 1987 inhalation CSF of 6.0 x 10<sup>-3</sup> (mg/kg-day)<sup>-1</sup> and the high end draft 2001 CSF of 0.4 (mg/kg-day)<sup>-1</sup> are used to estimate cancer risks.

 $<sup>^{3}</sup>$  Cancer risks are not calculated for chlorobenzene and 1,4-dichlorobenzene because they do not have cancer toxicity values. Shaded cells = exceed cancer risk of 1 x  $10^{-4}$ .

Table 5-8: Cancer Risk Results - Available Indoor Air Data - Reasonable Maximum Scenario

										Ca	ncer Ris	k						
Chemical of Potential Concern <sup>3</sup>						Reside	ences <sup>1</sup>								Town Hall			Police Dept.
Potential Concern	A	В	С	D	E	F	G	н	J	К	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene (1987) <sup>2</sup>	3.8E-06					3.8E-06	2.6E-05	3.4E-06	7.5E-07	3.8E-06	1.1E-06	7.1E-06	1.1E-05	5.5E-06	6.3E-06	5.5E-06	1.3E-06	2.8E-07
Vinyl chloride									9.4E-07	1.8E-06								
Benzene	4.2E-06	6.9E-06	4.1E-06	1.0E-05	3.1E-05	3.1E-05	1.0E-05	5.1E-06	5.1E-06	5.1E-06		4.1E-05	7.5E-06		3.0E-06	3.0E-06	2.1E-06	3.0E-06
Total Cancer Risk for Each Location (using 1987 TCE CSF)	8.0E-06	6.9E-06	4.1E-06	1.0E-05	3.1E-05	3.4E-05	3.6E-05	8.5E-06	6.8E-06	1.1E-05		4.8E-05	1.9E-05	5.5E-06	9.3E-06	8.5E-06	3.4E-06	3.3E-06

					Residences <sup>1</sup> Town Hall					Police Dept.								
Chemical of Potential Concern <sup>3</sup>	Α	В	С	D	E	F	G	Н	J	К	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene (draft 2001a) <sup>2</sup>									4.8E-05		7.3E-05						8.7E-05	1.8E-05
Vinyl chloride									9.4E-07	1.8E-06								
Benzene	4.2E-06	6.9E-06	4.1E-06	1.0E-05	3.1E-05	3.1E-05	1.0E-05	5.1E-06	5.1E-06	5.1E-06		4.1E-05	7.5E-06		3.0E-06	3.0E-06	2.1E-06	3.0E-06
Total Cancer Risk for Each Location (using draft high end 2001 TCE CSF)		6.9E-06	4.1E-06	1.0E-05	3.1E-05				5.4E-05								8.9E-05	2.1E-05

Shaded cells = exceed cancer risk of  $1 \times 10^{-4}$ 

<sup>&</sup>lt;sup>1</sup> No detects for Residences at Locations I and N.

<sup>&</sup>lt;sup>2</sup> For TCE, both the 1987 inhalation CSF of  $6.0 \times 10^{-3}$  (mg/kg-day)<sup>-1</sup> and the high end draft 2001 CSF of 0.4 (mg/kg-day)<sup>-1</sup> are used to estimate cancer risks.

<sup>&</sup>lt;sup>3</sup> Cancer risks are not calculated for chlorobenzene and 1,4-dichlorobenzene because they do not have cancer toxicity values.

Table 5-9: Noncancer Risk Results - Available Indoor Air Data Central Tendency Scenario

		Hazard Quotient																
Chemicals of	Residences <sup>1</sup>						Town Hall				Police Dept							
Potential Concern	A	В	С	D	E	F	G	н	J	К	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene	0.13					0.13	0.90	0.12	0.026	0.13	0.039	0.24	0.52	0.26	0.30	0.26	0.063	0.013
Vinyl chloride									0.0025	0.0049								
Benzene	0.042	0.068	0.041	0.10	0.31	0.31	0.10	0.051	0.051	0.051		0.41	0.10		0.041	0.041	0.028	0.041
Chlorobenzene									0.022									
1,4- Dichlorobenzene	0.00029							0.00072	-	0.0029	0.012	0.00029	0.0014		0.0017	0.0018	0.0017	0.00072
Total Hazard Index for Each Location <sup>2</sup>	0.17	0.068	0.041	0.10	0.31	0.44		0.17	0.10	0.19		0.65	0.62	0.26	0.34	0.30	0.093	0.055

Shaded cells = exceed hazard quotient or hazard index of one.

<sup>&</sup>lt;sup>1</sup> No data for Residences at Locations I and N.

<sup>&</sup>lt;sup>2</sup> Because the only difference between CTE noncancer risk calculations (Table 5-9) and RME noncancer risk calculations (Table 5-10) is the exposure duration, which changes in both the numerator and the denominator, and the maximum detected indoor air concentration is used for both CTE and RME, the calculated noncancer hazard quotients and hazard indices are the same for both scenarios for available indoor air data.

Table 5-10: Noncancer Risk Results - Available Indoor Air Data Reasonable Maximum Scenario

		Hazard Quotient																
Chemicals of		Residences <sup>1</sup>							Town Hall			Police Dept						
Potential Concern	A	В	С	D	E	F	G	н	J	к	L	М	Storage Area	Health Office, floor level (1990 data only)	Health Office, 4' or 5' above floor	Youth Advisory Board Room	Ambient Air	Dispatch Room
Trichloroethene	0.13					0.13	0.90	0.12	0.026	0.13	0.039	0.24	0.52	0.26	0.30	0.26	0.063	0.013
Vinyl chloride									0.0025	0.0049								
Benzene	0.042	0.068	0.041	0.10	0.31	0.31	0.10	0.051	0.051	0.051		0.41	0.10		0.041	0.041	0.028	0.041
Chlorobenzene									0.022									
1,4- Dichlorobenzene	0.00029							0.00072		0.0029	0.012	0.00029	0.0014		0.0017	0.0018	0.0017	0.00072
Total Hazard Index for Each Location <sup>2</sup>	0.17	0.068	0.041	0.10	0.31	0.44		0.17	0.10	0.19		0.65	0.62	0.26	0.34	0.30	0.093	0.055

Shaded cells = exceed hazard quotient or hazard index of one.

<sup>&</sup>lt;sup>1</sup> No data for Residences at Locations I and N.

<sup>&</sup>lt;sup>2</sup> Because the only difference between CTE noncancer risk calculations (Table 5-9) and RME noncancer risk calculations (Table 5-10) is the exposure duration, which changes in both the numerator and the denominator, and the maximum detected indoor air concentration is used for both CTE and RME, the calculated noncancer hazard quotients and hazard indices are the same for both scenarios for available indoor air data.

Table 5-11: Cancer Risk Results - Modeled Indoor Air Data - Central Tendency Scenario

	Cancer Risks						
Chemical of Potential Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab				
1,2,4-Trichlorobenzene	NA	NA	NA				
1,2-Dichlorobenzene	NA	NA	NA				
Naphthalene	NA	NA	NA				
Nitrobenzene	NA	NA	NA				
1,1-Dichloroethene	NA	NA	NA				
Benzene	1.7E-07	2.0E-06	1.2E-07				
Chlorobenzene	NA	NA	NA				
Methylene chloride	2.8E-09	3.9E-08	2.2E-09				
Trichloroethene (1987) <sup>1</sup>	2.7E-06	3.1E-05	1.9E-06				
Vinyl chloride	8.5E-07	1.1E-05	6.5E-07				
Total Estimated Cancer Risk (using 1987 TCE CSF)	3.7E-06	4.3E-05	2.7E-06				

	Cancer Risks						
Chemical of Potential Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab				
1,2,4-Trichlorobenzene	NA	NA	NA				
1,2-Dichlorobenzene	NA	NA	NA				
Naphthalene	NA	NA	NA				
Nitrobenzene	NA	NA	NA				
1,1-Dichloroethene	NA	NA	NA				
Benzene	1.7E-07	2.0E-06	1.2E-07				
Chlorobenzene	NA	NA	NA				
Methylene chloride	2.8E-09	3.9E-08	2.2E-09				
Trichloroethene (draft 2001a) <sup>1</sup>							
Vinyl chloride	8.5E-07	1.1E-05	6.5E-07				
Total Estimated Cancer Risk (using draft high end 2001 TCE CSF)							

 $^{1}$  For TCE, both the 1987 inhalation CSF of 6.0 x  $10^{-3}$  (mg/kg-day) $^{-1}$  and the high end draft 2001 CSF of 0.4 (mg/kg-day) $^{-1}$  are used to estimate cancer risks. Shaded cells = exceed cancer risk of 1 x  $10^{-4}$ .

Table 5-12: Cancer Risk Results – Modeled Indoor Air Data – Reasonable Maximum Scenario

	Cancer Risks						
Chemical of Potential Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab				
1,2,4-Trichlorobenzene	NA	NA	NA				
1,2-Dichlorobenzene	NA	NA	NA				
Naphthalene	NA	NA	NA				
Nitrobenzene	NA	NA	NA				
1,1-Dichloroethene	NA	NA	NA				
Benzene							
Chlorobenzene	NA	NA	NA				
Methylene chloride	3.0E-06	1.7E-05	2.1E-06				
Trichloroethene (1987) <sup>1</sup>							
Vinyl chloride							
Total Estimated Cancer Risk (using 1987 TCE CSF)							

	Cancer Risks						
Chemical of Potential Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab				
1,2,4-Trichlorobenzene	NA	NA	NA				
1,2-Dichlorobenzene	NA	NA	NA				
Naphthalene	NA	NA	NA				
Nitrobenzene	NA	NA	NA				
1,1-Dichloroethene	NA	NA	NA				
Benzene							
Chlorobenzene	NA	NA	NA				
Methylene chloride	3.0E-06	1.7E-05	2.1E-06				
Trichloroethene (draft 2001a) <sup>1</sup>							
Vinyl chloride							
Total Estimated Cancer Risk (using draft high end 2001 TCE CSF) <sup>2</sup>							

Shaded cells = exceed cancer risk of  $1 \times 10^{-4}$ 

<sup>1.</sup> For TCE, both the 1987 inhalation CSF of  $6.0 \times 10^{-3} \text{ (mg/kg-day)}^{-1}$  and the high end draft 2001 CSF of  $0.4 \text{ (mg/kg-day)}^{-1}$  are used to estimate cancer risks.

<sup>2.</sup> An estimated cancer risk exceeding one is not possible, and is a result of both the conservative inputs into the indoor air vapor intrusion model and the conservative cancer slope factor. This result demonstrates the conservative nature of the RME scenario.

Table 5-13: Noncancer Risk Results – Modeled Indoor Air Data – Central Tendency Scenario

Chemical of Potential		Hazard Quotients						
Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab					
1,2,4-Trichlorobenzene	0.014	0.14	0.011					
1,2-Dichlorobenzene	0.0030	0.036	0.0027					
Naphthalene	0.0066	0.12	0.0061					
Nitrobenzene	0.00076	0.13	0.00079					
1,1-Dichloroethene	0.0020	0.023	0.0019					
Benzene	0.0056	0.068	0.0053					
Chlorobenzene	0.14		0.13					
Methylene chloride	0.000016	0.00021	0.000015					
Trichloroethene	0.31		0.29					
Vinyl chloride	0.0075	0.095	0.0074					
Total Estimated Hazard Index	0.49		0.46					

Shaded cells = exceed a hazard quotient or hazard index of one.

Table 5-14: Noncancer Risk Results – Modeled Indoor Air Data – Reasonable Maximum Scenario

Chemical of Potential		Hazard Quotients							
Concern	Residential Concrete Basement	Residential Dirt Basement	Industrial/ Commercial Concrete Slab						
1,2,4-Trichlorobenzene									
1,2-Dichlorobenzene	1.0		0.87						
Naphthalene									
Nitrobenzene									
1,1-Dichloroethene	0.16	0.83	0.15						
Benzene									
Chlorobenzene									
Methylene chloride	0.0050	0.027	0.0048						
Trichloroethene									
Vinyl chloride									
Total Estimated Hazard Index									

Shaded cells = exceed a hazard quotient or hazard index of one.

**Table 5-15: Risk-Based TCE Ground Water Concentrations** 

Corresponding to a Cancer Risk of 1.0 x 10<sup>-4</sup>

	Indoor exposure ground water conc., carcinogen (μg/L) <sup>1</sup>						
	Below Ground Concrete Basement	Below Ground Dirt Basement	Industrial/Commercial Concrete Slab				
Central Tendency Exposure <sup>2</sup>	743	66	1,034				
Reasonable Maximum Exposure <sup>2</sup>	3	0.54	4.1				

Corresponding to a Hazard Quotient of 1.0

	Indoor exposure ground water conc., noncarcinogen (μg/L)						
	Below Ground Concrete Basement	Below Ground Dirt Basement	Industrial/Commercial Concrete Slab				
Central Tendency Exposure <sup>2</sup>	4,202	372	4,549				
Reasonable Maximum Exposure <sup>2</sup>	51	10	57				

<sup>1.</sup> The TCE ground water concentrations presented above incorporate the high end 2001 draft CSF for TCE, and the resulting inhalation unit risk of 1.1 x  $10^{-4}$  ( $\mu g/m^3$ )<sup>-1</sup>.

<sup>2.</sup> The CTE and RME scenarios use the J&E model input parameters for soil/ground water/building properties presented in Table 2-5 of this report.

### 6.0 Indoor Air HHRA Conclusions

Based on the results of the indoor air HHRA, potential human health risks may exist from exposure to vapors from contaminants in ground water at the Nyanza Site.

#### Measured Indoor Air Concentrations

The assessment of all of the measured indoor air data collected in 1990, 1998, and 2004 showed that the incremental cancer risks exceed EPA's acceptable incremental cancer risk range of 1 x  $10^{-6}$  to 1 x  $10^{-4}$  in 2 out of 14 residential houses sampled using a CTE calculation (the maximum indoor air concentration detected in that home and average exposure parameters), and in 7 out of 14 residential houses using a RME scenario (the maximum indoor air data detected in that home and reasonable maximum exposure parameters), when using the draft high end unit risk factor for TCE (EPA, 2001a). TCE represents the majority of the estimated cancer risk. Both the CTE and RME calculations exceed EPA's acceptable incremental cancer risk range of 1 x  $10^{-6}$  to 1 x  $10^{-4}$  at the Town Hall location. The Police Department cancer risk estimates are within EPA's acceptable risk range. The Town Hall and many of the residences sampled are situated over a portion of the Nyanza ground water plume that has historically had shallow ground water TCE concentrations greater than 1,000  $\mu$ g/l. The homes sampled included various basement types including dirt, stone, concrete block, and concrete slab.

Only one residential location has a noncancer hazard index that exceeds one, primarily due to benzene. This location was noted to have petroleum products stored in the basement that could contribute to increased air concentrations of VOCs.

# Modeled Air Concentrations Using the Johnson-Ettinger Model

Incremental CTE cancer risk estimates using the draft high end unit risk factor for TCE (EPA, 2001a) exceed EPA's acceptable risk range for the modeled residential dirt basement, residential concrete, and industrial/commercial concrete slab scenarios, and are similar to the CTE and RME cancer risks based on the actual measured indoor air concentrations. For the RME scenario, EPA's acceptable risk range is greatly exceeded using the previous (1987) and the draft (2001a) unit risk factors for TCE. CTE noncancer hazard indices exceed one only for the residential dirt basement scenario, and are similar to the noncancer risks based on the measured air concentrations. The RME noncancer hazard indices greatly exceed one for all scenarios (residential dirt basement, residential concrete basement, and industrial/commercial concrete slab). The noncancer risks are driven by TCE and chlorobenzene. The modeled RME risks are likely to be overestimated because:

• In general, the central tendency indoor air concentrations estimated by the model (based on the average ground water concentrations and using central tendency model parameters) are consistent with the range of actual measured indoor air

concentrations. However, the reasonable maximum indoor air concentrations (using the maximum ground water concentrations and high end, or conservative, building property inputs into the model) are many orders-of-magnitude higher than the actual measured concentrations.

- This HHRA used the Johnson-Ettinger model with several inputs based on typical, default, or conservative values for each of the building types. Three of the building-related properties change the risk results by more than an order-of-magnitude between the central tendency and the reasonable maximum scenarios. These three properties include: the indoor air exchange rate, the floor-wall seam crack width, and the soil-building differential. It is uncertain whether the conservative values used for the RME modeling scenario are appropriate to the Site, but they are likely to be overly conservative, based on the actual measured indoor air results discussed above.
- A range of slope factors is presented in EPA's TCE risk assessment report (2001a).
   EPA considers the presentation of a range to be reasonable in view of the risk factors that can modify the effects of TCE in different populations. This HHRA uses the most conservative of the slope factors presented in the EPA document. The appropriate measure of risk for TCE exposures for populations at this Site may lie anywhere within that range.

#### 7.0 References

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Appendix A: Selected Historical Ground Water Data for Indoor Air Model

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	GW-2	ERT-2 ERT2-11 Field Sam 11/15/20	01 ple	MW-102 MW102B-0 Field Sam 3/12/199	398 ple	MW-102 MW102B-0 Field Sam 4/19/200	0401 nple	MW-102 MW102B-0 Field Sam 4/23/200	)402 iple	MW-102 MW102B-0 Field Sam 7/16/200	703 ple	MW-102 MW102B- Field San 8/20/200	0802 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	83	ug/L	10.0 U	ug/L	11 U	ug/L	12 U	ug/L	<b>0.27</b> UJ	ug/L	11 U	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	350	ug/L	10.0 U	ug/L	11 U	ug/L	12 U	ug/L	0.23 J	ug/L	11 U	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	7.3 J	ug/L	10.0 U	ug/L	11 U	ug/L	12 U	ug/L	<b>0.27</b> UJ	ug/L	11 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	60	ug/L	10.0 U	ug/L	11 U	ug/L	12 U	ug/L	<b>0.27</b> UJ	ug/L	11 U	ug/L
3-Nitroaniline	NA		NA		27 U	ug/L	26.0 U	ug/L	<b>27</b> U	ug/L	29 U	ug/L	0.27 U	ug/L	<b>27</b> U	ug/L
4-Nitroaniline	NA		NA		27 U	ug/L	26.0 U	ug/L	27 U	ug/L	<b>29</b> UJ	ug/L	0.27 U	ug/L	27 U	ug/L
Aniline	NA		NA		4.3 J	ug/L	26.0 U	ug/L	R	ug/L	29 U	ug/L	0.27 UJ	ug/L	27 U	ug/L
Naphthalene	15	ug/L	6000	ug/l	11 U	ug/L	10.0 U	ug/L	11 U	ug/L	12 U	ug/L	0.27 UJ	ug/L	11 U	ug/L
Nitrobenzene	200	ug/L	NA		<b>1.3</b> J	ug/L	10.0 U	ug/L	11 U	ug/L	17 J	ug/L	0.27 UJ	ug/L	11 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		_		10.0 U	ug/L	-		_		-		-	
Pentachlorophenol	NA		NA		0.96	ug/L	26.0 U	ug/L	27 U	ug/L	<b>0.11</b> UJ	ug/L	0.54 UJ	ug/L	27 U	ug/L
Volatile Organics					,											
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		1000	ug/L	4.0 J	ug/L	4.4	ug/L	7.9	ug/L	7.1	ug/L	11	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	130 U	ug/L	10 U	ug/L	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
2-Hexanone	NA		NA		130 U	ug/L	10 U	ug/L	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		130 U	ug/L	10 U	ug/L	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Acetone	22000	ug/L	50000	ug/l	130 U	ug/L	10 U	ug/L	5.0 U	ug/L	5.0 U	ug/L	2.6 U	ug/L	5.0 U	ug/L
Benzene	5	ug/L	2000	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	<b>5.0</b> UJ	ug/L	1.0 U	ug/L
Carbon Disulfide	56	ug/L	NA		<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier		GC	MCP G	6W-2	ERT-2 ERT2-110	1	MW-102 MW102B-0		MW-102 MW102B-0		MW-102 MW102B-0		MW-102 MW102B-0		MW-102 MW102B-0	
QC Type					Field Samp		Field Sam		Field Sam	-	Field Sam	-	Field Sam		Field Sam	
Date Collected					11/15/200		3/12/199	•	4/19/200	•	4/23/200	•	7/16/200	•	8/20/200	•
Date Collected					11/10/200		0/12/100	J	4/10/200	<i>3</i> 1	4/20/200	<i>,</i>	7710/200	.0	0/20/200	02
Chlorobenzene	39	ug/L	1000	ug/l	71	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Chloroethane	2800	ug/L	NA		<b>26</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Chloroform	80	ug/L	400	ug/l	<b>26</b> U	ug/L	5.0 U	ug/L	<b>0.32</b> J	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Chloromethane	6.7	ug/L	NA		26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	1000	ug/L	4.0 J	ug/L	4.3	ug/L	7.5	ug/L	7.1	ug/L	10	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	0.50 U	ug/L	1.0 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>10</b> J	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Styrene	890	ug/L	900	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	26 U	ug/L	5.0 U	ug/L	1. <b>0</b> U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Toluene	150	ug/L	6000	ug/l	26 U	ug/L	5.0 U	ug/L	1. <b>0</b> U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	8.6 J	ug/L	5.0 U	ug/L	1. <b>0</b> U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	<b>0.50</b> U	ug/L	1.0 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	200	ug/L	12	ug/L	3.7	ug/L	9.1	ug/L	6.2	ug/L	9.5 J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	27	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Xylene (m,p)	2200	ug/L	NA		<b>26</b> U	ug/L	-		1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Xylene (o)	3300	ug/L	NA		26 U	ug/L	-		1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L
Xylenes	2200	ug/L	6000	ug/l	26 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	1.0 U	ug/L	2.0 U	ug/L	1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	ЕРА Т	GC	MCP G	SW-2	MW-102 MW102B-1 Field Sam 10/28/200	003 ple	MW-102i MW102B-1 Field Sam 11/13/200	101 ole	MW-104 MW104B-0 Field Sam 3/10/199	)398 iple	MW-104 MW104B-0 Field Sam 4/27/199	)499 iple	MW-104 MW104B-06 Field Sam 6/26/200	600-2 ple	MW-104 MW104B- Field San 9/18/20	0900 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	0.28 U	ug/L	10 U	ug/L	10.0 UJ	ug/L	10.0 U	ug/L	10 U	ug/L	10 U	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	0.28 U	ug/L	10 U	ug/L	<b>5.3</b> J	ug/L	3.0 J	ug/L	5.4 J	ug/L	12	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	0.28 U	ug/L	10 U	ug/L	10.0 U	ug/L	10.0 U	ug/L	10 U	ug/L	10 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	0.28 U	ug/L	10 U	ug/L	0.92 J	ug/L	<b>0.50</b> J	ug/L	10 U	ug/L	10 U	ug/L
3-Nitroaniline	NA		NA		0.28 U	ug/L	<b>26</b> U	ug/L	<b>25.0</b> UJ	ug/L	26.0 U	ug/L	25 U	ug/L	<b>26</b> U	ug/L
4-Nitroaniline	NA		NA		0.28 U	ug/L	<b>26</b> UJ	ug/L	<b>25.0</b> UJ	ug/L	26.0 U	ug/L	25 U	ug/L	<b>26</b> U	ug/L
Aniline	NA		NA		0.28 U	ug/L	<b>26</b> U	ug/L	<b>160</b> J	ug/L	51.0	ug/L	29	ug/L	8.0 J	ug/L
Naphthalene	15	ug/L	6000	ug/l	0.28 U	ug/L	<b>10</b> U	ug/L	10.0 UJ	ug/L	10.0 U	ug/L	10 U	ug/L	10 U	ug/L
Nitrobenzene	200	ug/L	NA		0.28 U	ug/L	10 U	ug/L	10.0 J	ug/L	10.0 U	ug/L	10 U	ug/L	<b>10</b> U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		<b>10.0</b> UJ	ug/L	-		_		-	
Pentachlorophenol	NA		NA		0.28 U	ug/L	0.095 U	ug/L	<b>25.0</b> UJ	ug/L	26.0 U	ug/L	25 U	ug/L	0.11	ug/L
Volatile Organics		'		,			1						'	,		
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 UJ	ug/L	<b>3.4</b> UJ	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		6.2	ug/L	3.7	ug/L	110	ug/L	110	ug/L	<b>94</b> J	ug/L	130	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 UJ	ug/L	3.4 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	2.0 U	ug/L	5.0 ∪	ug/L	<b>10</b> U	ug/L	<b>16</b> U	ug/L	10 U	ug/L	<b>17</b> U	ug/L
2-Hexanone	NA		NA		5.0 U	ug/L	5.0 ∪	ug/L	<b>10</b> U	ug/L	<b>16</b> U	ug/L	10 U	ug/L	<b>17</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		2.0 U	ug/L	5.0 U	ug/L	<b>10</b> U	ug/L	<b>16</b> U	ug/L	10 U	ug/L	<b>17</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	5.0 U	ug/L	5.0 ∪	ug/L	<b>10</b> U	ug/L	<b>16</b> U	ug/L	10 U	ug/L	<b>17</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	3.4 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	3.4 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	3.4 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>5.0</b> UJ	ug/L	1.0 U	ug/L	5.0 U	ug/L	<b>3.1</b> UJ	ug/L	2.0 U	ug/L	3.4 U	ug/L
Carbon Disulfide	56	ug/L	NA		2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	3.4 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	2.0 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	3.4 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-102B	MW-102B	MW-104B	MW-104B	MW-104B	MW-104B
Sample Identifier					MW102B-1003	MW102B-1101	MW104B-0398	MW104B-0499	MW104B-0600-2	MW104B-0900
QC Type					Field Sample	Field Sample	Field Sample	Field Sample	Field Sample	Field Sample
Date Collected					10/28/2003	11/13/2001	3/10/1998	4/27/1999	6/26/2000	9/18/2000
		/!	4000	uall						
Chlorobenzene	39	ug/L	1000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Chloroethane	2800	ug/L	NA		2.0 UJ ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Chloroform	80	ug/L	400	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Chloromethane	6.7	ug/L	NA		2.0 UJ ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	6.2 ug/L	3.7 ug/L	110 ug/L	110 ug/L	<b>86</b> J ug/L	<b>120</b> ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	0.50 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Dibromochloromethane	3.2	ug/L	NA		2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Ethylbenzene	700	ug/L	30000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Methylene chloride	58	ug/L	50000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	1.3 J ug/L	2.0 U ug/L	1.5 J ug/L
Styrene	890	ug/L	900	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Toluene	150	ug/L	6000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	2.0 U ug/L	1.0 U ug/L	1.2 J ug/L	1.5 J ug/L	1.3 J ug/L	1.1 J ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	0.50 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Trichloroethene	5	ug/L	300	ug/l	6.6 ug/L	8.7 ug/L	<b>12</b> ug/L	<b>10</b> J ug/L	<b>12</b> J ug/L	<b>11</b> ug/L
Vinyl chloride	2	ug/L	2	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	3.4 U ug/L
Xylene (m,p)	2200	ug/L	NA		2.0 U ug/L	1.0 U ug/L	-	-	2.0 U ug/L	3.4 U ug/L
Xylene (o)	3300	ug/L	NA		2.0 U ug/L	1.0 U ug/L	-	-	2.0 U ug/L	3.4 U ug/L
Xylenes	2200	ug/L	6000	ug/l	2.0 U ug/L	1.0 U ug/L	5.0 U ug/L	3.1 U ug/L	2.0 U ug/L	-

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier	EPA T	GC	MCP G	6W-2	MW-104 MW104B-1		MW-10 <i>A</i> MW10A-07		MW-11 MW111-10		MW-112 MW112B-0		MW-112 MW112B-0		MW-113 MW113B-	
QC Type					Field Sam		Field Sam		Field Sam		Field Sam		Field Sam	-	Field San	
Date Collected					10/4/199		7/17/200	'	11/3/200	•	3/11/199	•	4/19/200	•	3/11/19	•
Date conceied					10, 1, 100	Ü	7,17,200		1170/200	,0	3,11,100		1710/200	, ,	9,11,10	00
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>1.2</b> J	ug/L	64 J	ug/L	120	ug/L	22.0	ug/L	4.8 J	ug/L	140	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	12.0	ug/L	<b>2700</b> J	ug/L	86	ug/L	100	ug/L	21	ug/L	670	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	0.80 J	ug/L	<b>32</b> J	ug/L	<b>15</b> U	ug/L	3.0 J	ug/L	10 U	ug/L	30.0	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	1.8 J	ug/L	<b>360</b> J	ug/L	<b>14</b> J	ug/L	23.0	ug/L	<b>4.1</b> J	ug/L	150	ug/L
3-Nitroaniline	NA		NA		26.0 U	ug/L	5.3 UJ	ug/L	<b>15</b> U	ug/L	25.0 U	ug/L	25 U	ug/L	25.0 U	ug/L
4-Nitroaniline	NA		NA		26.0 U	ug/L	5.3 UJ	ug/L	<b>15</b> U	ug/L	25.0 U	ug/L	25 U	ug/L	25.0 U	ug/L
Aniline	NA		NA		<b>15.0</b> J	ug/L	3.2 J	ug/L	860	ug/L	<b>5.2</b> J	ug/L	R	ug/L	<b>510</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	10.0 U	ug/L	5.3 U	ug/L	<b>15</b> U	ug/L	10.0 U	ug/L	10 U	ug/L	10.0 U	ug/L
Nitrobenzene	200	ug/L	NA		10.0 U	ug/L	5.3 U	ug/L	<b>15</b> U	ug/L	10.0 U	ug/L	10 U	ug/L	600	ug/L
N-Nitroso-di-n-propylamine	NA		NA		_		_		-		10.0 U	ug/L	-		10.0 U	ug/L
Pentachlorophenol	NA		NA		0.16 J	ug/L	11 UJ	ug/L	<b>59</b> UJ	ug/L	25.0 U	ug/L	25 U	ug/L	25.0 U	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>6.0</b> U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	6.0 U	ug/L	2.0 UJ	ug/L	2.0 U	ug/L	13	ug/L	1.0 U	ug/L	18 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		140	ug/L	64	ug/L	18	ug/L	5.0 U	ug/L	2.5	ug/L	300	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>30</b> U	ug/L	2.0 U	ug/L	2.0 U	ug/L	10 U	ug/L	5.0 U	ug/L	37 U	ug/L
2-Hexanone	NA		NA		<b>30</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L	10 U	ug/L	5.0 U	ug/L	37 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>30</b> U	ug/L	2.0 U	ug/L	2.0 U	ug/L	10 U	ug/L	5.0 U	ug/L	<b>37</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	<b>30</b> U	ug/L	2.8 U	ug/L	5.0 U	ug/L	10 U	ug/L	5.0 U	ug/L	<b>37</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	6.0 U	ug/L	1.4 J	ug/L	2.2	ug/L	<b>2.2</b> J	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Bromodichloromethane	2.1	ug/L	NA		6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L
Bromomethane	2	ug/L	2	ug/l	6.0 U	ug/L	5.0 UJ	ug/L	<b>5.0</b> UJ	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L
Carbon Disulfide	56	ug/L	NA		6.0 U	ug/L	2.0 UJ	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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## Appendix A Selected Historical Ground Water Data for Indoor Air Model

Nyanza Superfund Site

Sample Location Name Sample Identifier QC Type Date Collected	ЕРА Т	GC	MCP G	6W-2	MW-104B MW104B-10 Field Samp 10/4/1999	099 ole	MW-10A MW10A-07 Field Sam 7/17/200	703 ple	MW-11 MW111-1 Field Sam 11/3/200	003 nple	MW-112 MW112B-0 Field San 3/11/199	0398 nple	MW-112 MW112B-0 Field Sam 4/19/200	401 ple	MW-113 MW113B-0 Field Sam 3/11/199	0398 nple
Chlorobenzene	39	ug/L	1000	ug/l	6.0 U	ug/L	<b>57</b> J	ug/L	54	ug/L	74	ug/L	3.9	ug/L	390	ug/L
Chloroethane	2800	ug/L	NA		<b>6.0</b> U	ug/L	2.0 UJ	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Chloromethane	6.7	ug/L	NA		6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	<b>1.0</b> UJ	ug/L	<b>18</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	140	ug/L	63	ug/L	18	ug/L	13	ug/L	2.4	ug/L	300	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	6.0 U	ug/L	0.50 U	ug/L	<b>0.50</b> U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Dibromochloromethane	3.2	ug/L	NA		6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	6.0 U	ug/L	2.0 U	ug/L	1.2 J	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	6.0 U	ug/L	2.0 UJ	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Styrene	890	ug/L	900	ug/l	6.0 U	ug/L	2.0 UJ	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	6.0 U	ug/L	<b>1.3</b> J	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	18 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	6.0 U	ug/L	0.50 U	ug/L	0.50 U	ug/L	5.0 U	ug/L	<b>1.0</b> U	ug/L	18 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	14	ug/L	36	ug/L	28	ug/L	76	ug/L	2.5	ug/L	590	ug/L
Vinyl chloride	2	ug/L	2	ug/l	6.0 U	ug/L	<b>2.4</b> J	ug/L	5.0	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>14</b> J	ug/L
Xylene (m,p)	2200	ug/L	NA		-		2.0 U	ug/L	2.0 U	ug/L	-		1.0 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		-		2.0 U	ug/L	2.0 U	ug/L	-		1.0 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	6.0 U	ug/L	2.0 U	ug/L	2.0 U	ug/L	5.0 U	ug/L	1.0 U	ug/L	<b>18</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	ЕРА Т	GC	MCP G	GW-2	MW-113 MW113B-0 Field Sam 4/23/200	401 ple	MW-113 MW113B-0 Field Sam 4/25/200	402 ple	MW-113 MW113B-0 Field Sam 4/28/199	0499 nple	MW-113 MW113B-0 Field Sam 6/22/200	)600 iple	MW-113 MW113B-0 Field Sam 7/18/200	703 ple	MW-113 MW113B- Field San 8/21/20	0802 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	190 J	ug/L	150 J	ug/L	92.0	ug/L	<b>110</b> J	ug/L	6.0 J	ug/L	160 J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	<b>1000</b> J	ug/L	800	ug/L	500	ug/L	410	ug/L	<b>66</b> J	ug/L	820	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	<b>36</b> J	ug/L	120 U	ug/L	18.0	ug/L	21	ug/l	2.4 J	ug/L	<b>36</b> J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>280</b> J	ug/L	190	ug/L	100	ug/L	<b>110</b> J	ug/l	<b>11</b> J	ug/L	190	ug/L
3-Nitroaniline	NA		NA		<b>25</b> UJ	ug/L	<b>300</b> U	ug/L	28.0 U	ug/L	25 U	ug/L	<b>0.56</b> U	ug/L	370 U	ug/L
4-Nitroaniline	NA		NA		<b>25</b> U	ug/L	<b>300</b> UJ	ug/L	28.0 U	ug/L	25 U	ug/L	<b>0.56</b> U	ug/L	370 U	ug/L
Aniline	NA		NA		<b>37</b> J	ug/L	120 U	ug/L	190	ug/L	<b>74</b> J	ug/l	1.6 J	ug/L	370 U	ug/L
Naphthalene	15	ug/L	6000	ug/l	10 U	ug/L	120 U	ug/L	11.0 U	ug/L	10 U	ug/L	<b>0.56</b> U	ug/L	150 U	ug/L
Nitrobenzene	200	ug/L	NA		<b>2200</b> J	ug/L	420	ug/L	330	ug/L	<b>270</b> J	ug/l	<b>31</b> J	ug/L	420	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		-		-		-		-	
Pentachlorophenol	NA		NA		25 U	ug/L	0.30 J	ug/L	28.0 U	ug/L	25 U	ug/L	1.1 UJ	ug/L	370 U	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	<b>1.2</b> J	ug/L	14 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		250	ug/L	270	ug/L	250	ug/L	300	ug/L	29	ug/L	240	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	84 U	ug/L	<b>60</b> U	ug/L	<b>56</b> U	ug/L	92 U	ug/L	2.0 U	ug/L	<b>68</b> U	ug/L
2-Hexanone	NA		NA		84 UJ	ug/L	<b>60</b> U	ug/L	<b>56</b> U	ug/L	88 U	ug/L	2.0 U	ug/L	<b>68</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		84 U	ug/L	60 U	ug/L	<b>56</b> U	ug/L	92 U	ug/L	2.0 U	ug/L	<b>68</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	84 UJ	ug/L	<b>60</b> U	ug/L	<b>56</b> U	ug/L	88 U	ug/L	1.4 U	ug/L	<b>68</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	<b>17</b> U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>17</b> U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>17</b> U	ug/L	12 U	ug/L	11 U	ug/L	18 UJ	ug/L	2.0 U	ug/L	14 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>17</b> U	ug/L	12 U	ug/L	11 UJ	ug/L	18 UJ	ug/L	2.0 UJ	ug/L	14 U	ug/L
Carbon Disulfide	56	ug/L	NA		17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	17 U	ug/L	12 U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	SW-2	MW-113l MW113B-0 Field Sam 4/23/200	401 ple	MW-113 MW113B-0 Field Sam 4/25/200	9402 ple	MW-113 MW113B-0 Field Sam 4/28/199	0499 nple	MW-113 MW113B-0 Field Sam 6/22/200	0600 nple	MW-113 MW113B-0 Field Sam 7/18/200	703 ple	MW-113 MW113B-0 Field Sam 8/21/200	0802 nple
Chlorobenzene	39	ug/L	1000	ug/l	<b>240</b> J	ug/L	230	ug/L	290	ug/L	330	ug/L	14 J	ug/L	230	ug/L
Chloroethane	2800	ug/L	NA		17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	<b>18</b> U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Chloromethane	6.7	ug/L	NA		17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	260	ug/L	250	ug/L	250	ug/L	280	ug/L	28	ug/L	<b>230</b> J	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	0.50 U	ug/L	14 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Styrene	890	ug/L	900	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 UJ	ug/L	14 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	17 UJ	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
Toluene	150	ug/L	6000	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	14 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	<b>1.1</b> J	ug/L	14 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	0.50 U	ug/L	14 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	<b>400</b> J	ug/L	410	ug/L	<b>430</b> J	ug/L	560	ug/L	<b>21</b> J	ug/L	<b>410</b> J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	<b>15</b> J	ug/L	24	ug/L	15	ug/L	<b>14</b> J	ug/L	14	ug/L	14	ug/L
Xylene (m,p)	2200	ug/L	NA		17 U	ug/L	12 U	ug/L	-		<b>18</b> U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L
Xylene (o)	3300	ug/L	NA		17 U	ug/L	<b>12</b> U	ug/L	-		18 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	17 U	ug/L	<b>12</b> U	ug/L	11 U	ug/L	18 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	iW-2	MW-113 MW113B-0 Field Sam 9/19/200	900 ple	MW-113 MW113B-1 Field Sam 10/31/200	003 ple	MW-113 MW113B- <sup>2</sup> Field Sam 10/5/199	1099 nple	MW-113 MW113B-1 Field Sam 11/16/20	101 ple	MW-115 MW115B-0 Field Sam 3/11/199	398 ple	MW-115 MW115B-0 Field San 4/20/200	0401 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>220</b> J	ug/L	2.1 J	ug/L	87.0	ug/L	<b>180</b> J	ug/L	140	ug/L	<b>210</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	1000	ug/L	<b>17</b> J	ug/L	<b>380</b> J	ug/L	<b>1100</b> J	ug/L	<b>300</b> J	ug/L	2800	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	37	ug/L	<b>1.1</b> J	ug/L	20.0	ug/L	<b>46</b> J	ug/L	18.0	ug/L	11 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>220</b> J	ug/L	<b>3.7</b> J	ug/L	90.0	ug/L	<b>230</b> J	ug/L	49.0 J	ug/L	<b>47</b> 0 J	ug/L
3-Nitroaniline	NA	İ	NA		<b>26</b> U	ug/L	0.27 U	ug/L	<b>26.0</b> U	ug/L	<b>26</b> UJ	ug/L	25.0 U	ug/L	<b>27</b> U	ug/L
4-Nitroaniline	NA		NA		<b>26</b> U	ug/L	0.27 U	ug/L	<b>26.0</b> U	ug/L	<b>26</b> UJ	ug/L	25.0 U	ug/L	<b>27</b> U	ug/L
Aniline	NA		NA		<b>72</b> J	ug/L	0.42 U	ug/L	100 J	ug/L	9.2 J	ug/L	7000 J	ug/L	15000 J	ug/L
Naphthalene	15	ug/L	6000	ug/l	10 U	ug/L	0.27 U	ug/L	10.0 U	ug/L	11 U	ug/L	170	ug/L	<b>360</b> J	ug/L
Nitrobenzene	200	ug/L	NA		510	ug/L	<b>13</b> J	ug/L	180	ug/L	<b>710</b> J	ug/L	10.0 U	ug/L	11 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		_		_		-		10.0 U	ug/L	_	
Pentachlorophenol	NA		NA		<b>0.67</b> J	ug/L	0.27 U	ug/L	<b>0.26</b> J	ug/L	0.62	ug/L	25.0 U	ug/L	<b>27</b> U	ug/L
Volatile Organics		-					'				'					
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	22 U	ug/L	2.0 U	ug/L	<b>2.4</b> J	ug/L	<b>6.0</b> J	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	<b>190</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		340	ug/L	<b>14</b> J	ug/L	120	ug/L	400	ug/L	290	ug/L	370	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	<b>180</b> U	ug/L	190 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	110 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L	100 U	ug/L	<b>370</b> U	ug/L	940 U	ug/L
2-Hexanone	NA		NA		110 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L	100 U	ug/L	<b>370</b> U	ug/L	940 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		110 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L	100 U	ug/L	370 U	ug/L	940 U	ug/L
Acetone	22000	ug/L	50000	ug/l	110 U	ug/L	2.0 U	ug/L	<b>14</b> U	ug/L	<b>22</b> J	ug/L	370 U	ug/L	940 U	ug/L
Benzene	5	ug/L	2000	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	<b>68</b> J	ug/L	<b>51</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> UJ	ug/L	180 U	ug/L	190 U	ug/L
Bromomethane	2	ug/L	2	ug/l	22 U	ug/L	5.0 UJ	ug/L	2.7 U	ug/L	<b>20</b> UJ	ug/L	180 U	ug/L	<b>190</b> U	ug/L
Carbon Disulfide	56	ug/L	NA		22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name		GC	MCP G	3W-2	MW-113	В	MW-113	В	MW-113	3B	MW-113	ВВ	MW-115	В	MW-115	5B
Sample Identifier					MW113B-0	900	MW113B-1	1003	MW113B-1	1099	MW113B-1	1101	MW115B-0	398	MW115B-0	0401
QC Type					Field Sam	ple	Field Sam	ple	Field Sam	nple	Field Sam	ple	Field Sam	ıple	Field Sam	nple
Date Collected					9/19/200	0	10/31/20	03	10/5/199	99	11/16/20	01	3/11/199	98	4/20/200	01
Chlorobenzene	39	ug/L	1000	ug/l	410	ug/L	7.7 J	ug/L	86	ug/L	<b>560</b> J	ug/L	3500	ug/L	2900	ug/L
Chloroethane	2800	ug/L	NA		22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	<b>190</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	190 U	ug/L
Chloromethane	6.7	ug/L	NA		22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	190 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	310	ug/L	<b>14</b> J	ug/L	120	ug/L	<b>390</b> J	ug/L	290	ug/L	360	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	22 U	ug/L	0.50 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	190 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	190 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>20</b> U	ug/L	180 U	ug/L	190 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>22</b> UJ	ug/L	2.0 U	ug/L	2.7 U	ug/L	<b>12</b> J	ug/L	180 U	ug/L	190 U	ug/L
Styrene	890	ug/L	900	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
Toluene	150	ug/L	6000	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	<b>180</b> U	ug/L	190 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	<b>22</b> U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	<b>22</b> U	ug/L	0.50 ∪	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	610	ug/L	14	ug/L	80	ug/L	<b>840</b> J	ug/L	6200	ug/L	5600	ug/L
Vinyl chloride	2	ug/L	2	ug/l	<b>17</b> J	ug/L	5.5	ug/L	27	ug/L	30	ug/L	180 U	ug/L	190 U	ug/L
Xylene (m,p)	2200	ug/L	NA		<b>22</b> U	ug/L	2.0 U	ug/L	-		<b>20</b> U	ug/L	-		<b>190</b> U	ug/L
Xylene (o)	3300	ug/L	NA		<b>22</b> U	ug/L	2.0 U	ug/L	-		<b>20</b> U	ug/L	-		<b>190</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	22 U	ug/L	2.0 U	ug/L	2.7 U	ug/L	20 U	ug/L	180 U	ug/L	190 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	W-2	MW-115 MW115B-0 Field Sam 4/25/200	402 ple	MW-115 MW115B-0 Field Sam 4/26/199	499 ple	MW-115 MW115B-0 Field Sam 6/20/200	0600 nple	MW-115 MW115B-0 Field Sam 9/14/200	900 ple	MW-115 MW115B-1 Field Sam 10/31/200	003 ole	MW-115 MW115B-1 Field Sam 10/5/199	1099 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>240</b> J	ug/L	130	ug/L	240	ug/L	210	ug/L	<b>160</b> J	ug/L	<b>180</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	2600	ug/L	1900	ug/L	2800	ug/L	2500	ug/L	<b>1800</b> J	ug/L	<b>2800</b> J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	2400 U	ug/L	<b>28.0</b> J	ug/L	43	ug/L	<b>42</b> J	ug/L	<b>110</b> UJ	ug/L	<b>24.0</b> UJ	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>480</b> J	ug/L	310	ug/L	500	ug/L	320	ug/L	<b>320</b> J	ug/L	<b>440</b> J	ug/L
3-Nitroaniline	NA		NA		5900 U	ug/L	<b>260</b> U	ug/L	<b>26</b> U	ug/L	130 U	ug/L	110 U	ug/L	<b>26</b> .0 UJ	ug/L
4-Nitroaniline	NA		NA		<b>5900</b> UJ	ug/L	<b>260</b> U	ug/L	26 U	ug/L	<b>130</b> UJ	ug/L	110 U	ug/L	<b>26.0</b> UJ	ug/L
Aniline	NA		NA		<b>18000</b> J	ug/L	5200	ug/L	20000	ug/L	7800	ug/L	5500	ug/L	<b>15000</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	<b>400</b> J	ug/L	210	ug/L	370	ug/L	250	ug/L	260	ug/L	<b>340</b> J	ug/L
Nitrobenzene	200	ug/L	NA		<b>2400</b> U	ug/L	110 U	ug/L	10 U	ug/L	53 U	ug/L	<b>110</b> UJ	ug/L	10.0 UJ	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		_		-		-		-	
Pentachlorophenol	NA		NA		1.3	ug/L	<b>260</b> U	ug/L	26 U	ug/L	1.1	ug/L	<b>430</b> UJ	ug/L	<b>0.82</b> J	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>180</b> U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	100 U	ug/L	170 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>180</b> U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	100 U	ug/L	170 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>180</b> U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	100 U	ug/L	170 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>180</b> U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> UJ	ug/L	100 U	ug/L	170 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	180 U	ug/L	100 U	ug/L	170 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	180 U	ug/L	100 U	ug/L	170 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		430	ug/L	270	ug/L	400	ug/L	330	ug/L	<b>360</b> J	ug/L	260	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	<b>180</b> U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	100 U	ug/L	170 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	880 U	ug/L	<b>630</b> U	ug/L	960 U	ug/L	920 U	ug/L	100 U	ug/L	850 U	ug/L
2-Hexanone	NA		NA		880 U	ug/L	<b>630</b> U	ug/L	960 U	ug/L	<b>920</b> U	ug/L	100 U	ug/L	850 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		880 U	ug/L	<b>630</b> U	ug/L	960 U	ug/L	<b>920</b> U	ug/L	100 U	ug/L	<b>850</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	880 U	ug/L	<b>630</b> U	ug/L	960 U	ug/L	<b>920</b> U	ug/L	100 U	ug/L	<b>780</b> J	ug/L
Benzene	5	ug/L	2000	ug/l	<b>60</b> J	ug/L	<b>54</b> J	ug/L	<b>67</b> J	ug/L	180 U	ug/L	<b>100</b> U	ug/L	<b>52</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>180</b> U	ug/L	120 U	ug/L	<b>190</b> U	ug/L	180 U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>180</b> U	ug/L	120 U	ug/L	<b>190</b> U	ug/L	180 U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>180</b> U	ug/L	120 UJ	ug/L	<b>190</b> U	ug/L	180 U	ug/L	<b>250</b> UJ	ug/L	170 U	ug/L
Carbon Disulfide	56	ug/L	NA		<b>180</b> U	ug/L	120 U	ug/L	<b>190</b> U	ug/L	180 U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	180 U	ug/L	100 U	ug/L	170 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected		GC	MCP G	6W-2	MW-115 MW115B-0 Field Sam 4/25/200	402 ple	MW-115 MW115B-0 Field Sam 4/26/199	1499 ple	MW-115 MW115B-0 Field Sam 6/20/200	0600 nple	MW-115 MW115B-0 Field Sam 9/14/200	900 ple	MW-115 MW115B-1 Field Sam 10/31/20	003 ple	MW-115 MW115B- Field Sam 10/5/199	1099 nple
Chlorobenzene	39	ug/L	1000	ug/l	3000	ug/L	3400	ug/L	3700	ug/L	3100	ug/L	<b>2700</b> J	ug/L	2800	ug/L
Chloroethane	2800	ug/L	NA		180 U	ug/L	120 U	ug/L	190 U	ug/L	180 U	ug/L	100 U	ug/L	170 U	ug/L
Chloroform	80	ug/L	400	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Chloromethane	6.7	ug/L	NA		180 U	ug/L	120 U	ug/L	190 UJ	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	<b>170</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	400	ug/L	280	ug/L	380	ug/L	320	ug/L	<b>360</b> J	ug/L	240	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>25</b> U	ug/L	170 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	180 U	ug/L	<b>70</b> J	ug/L	190 U	ug/L	<b>63</b> J	ug/L	<b>100</b> U	ug/L	<b>43</b> J	ug/L
Styrene	890	ug/L	900	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
Toluene	150	ug/L	6000	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> UJ	ug/L	<b>100</b> U	ug/L	170 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>25</b> U	ug/L	<b>170</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	5900	ug/L	<b>5600</b> J	ug/L	6800	ug/L	5600	ug/L	5700	ug/L	4600	ug/L
Vinyl chloride	2	ug/L	2	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	<b>180</b> U	ug/L	<b>100</b> U	ug/L	<b>170</b> U	ug/L
Xylene (m,p)	2200	ug/L	NA		180 U	ug/L	-		190 U	ug/L	180 U	ug/L	100 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		180 U	ug/L	-		190 U	ug/L	180 U	ug/L	100 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	180 U	ug/L	120 U	ug/L	190 U	ug/L	180 U	ug/L	100 U	ug/L	170 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	GW-2	MW-115 MW115B-1 Field Sam 11/16/200	101 ple	MW-20 <sup>2</sup> MW201-0 <sup>2</sup> Field Sam 4/23/200	102 ple	MW-20 MW201-0 Field Sam 7/16/200	703 iple	MW-20 MW201-0 Field Sam 8/20/200	802 iple	MW-20 MW201-1 Field Sam 10/29/20	003 ple	MW-20 MW201-1 Field San 11/15/20	1101 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	210	ug/L	<b>260</b> J	ug/L	<b>120</b> J	ug/L	<b>240</b> J	ug/L	180	ug/L	150	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	<b>2500</b> J	ug/L	<b>940</b> J	ug/L	<b>430</b> J	ug/L	<b>980</b> J	ug/L	680	ug/L	600	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	<b>28</b> J	ug/L	120 U	ug/L	9.2 J	ug/L	<b>25</b> J	ug/L	16	ug/L	14	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>400</b> J	ug/L	<b>190</b> J	ug/L	<b>75</b> J	ug/L	<b>150</b> J	ug/L	130	ug/L	<b>97</b> J	ug/L
3-Nitroaniline	NA		NA		<b>280</b> U	ug/L	300 U	ug/L	<b>2.7</b> U	ug/L	86 U	ug/L	2.8 U	ug/L	<b>26</b> U	ug/L
4-Nitroaniline	NA		NA		<b>280</b> U	ug/L	300 UJ	ug/L	<b>2.7</b> U	ug/L	86 U	ug/L	2.8 U	ug/L	<b>26</b> U	ug/L
Aniline	NA		NA		14000	ug/L	300 U	ug/L	<b>8.4</b> J	ug/L	86 U	ug/L	6.4	ug/L	<b>3.7</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	370	ug/L	120 U	ug/L	<b>2.7</b> UJ	ug/L	34 U	ug/L	2.8 U	ug/L	11 U	ug/L
Nitrobenzene	200	ug/L	NA		<b>110</b> U	ug/L	120 U	ug/L	<b>2.7</b> UJ	ug/L	34 U	ug/L	2.8 U	ug/L	11 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		-		-		-		-	
Pentachlorophenol	NA		NA		1.2	ug/L	<b>0.57</b> J	ug/L	5.4 UJ	ug/L	86 U	ug/L	2.8 U	ug/L	0.36	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	20 U	ug/L	<b>26</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	20 U	ug/L	<b>26</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	<b>160</b> U	ug/L	51 U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		460	ug/L	240	ug/L	220	ug/L	250	ug/L	180	ug/L	160	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	<b>160</b> U	ug/L	51 U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>780</b> U	ug/L	260 U	ug/L	<b>20</b> U	ug/L	150 U	ug/L	<b>20</b> U	ug/L	<b>130</b> U	ug/L
2-Hexanone	NA		NA		<b>780</b> U	ug/L	260 U	ug/L	<b>20</b> U	ug/L	150 U	ug/L	50 U	ug/L	<b>130</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>780</b> U	ug/L	260 U	ug/L	<b>20</b> U	ug/L	150 U	ug/L	<b>20</b> U	ug/L	<b>130</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	<b>780</b> U	ug/L	260 U	ug/L	<b>50</b> U	ug/L	150 U	ug/L	50 U	ug/L	<b>130</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	<b>66</b> J	ug/L	<b>32</b> J	ug/L	30	ug/L	<b>27</b> J	ug/L	28	ug/L	<b>22</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>160</b> U	ug/L	<b>51</b> U	ug/L	20 U	ug/L	<b>29</b> U	ug/L	20 U	ug/L	<b>26</b> U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	20 U	ug/L	<b>26</b> U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>160</b> UJ	ug/L	<b>51</b> U	ug/L	<b>20</b> UJ	ug/L	<b>29</b> U	ug/L	<b>50</b> UJ	ug/L	<b>26</b> U	ug/L
Carbon Disulfide	56	ug/L	NA		160 U	ug/L	<b>51</b> U	ug/L	20 U	ug/L	<b>29</b> U	ug/L	20 U	ug/L	<b>26</b> U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	<b>160</b> U	ug/L	51 U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	20 U	ug/L	<b>26</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-115I	В	MW-20	1	MW-20	1	MW-20	1	MW-20	1	MW-20	)1
Sample Identifier					MW115B-1	101	MW201-0	402	MW201-0	703	MW201-0	802	MW201-10	003	MW201-1	101
QC Type					Field Sam	ple	Field Sam	ple	Field Sam	nple	Field Sam	nple	Field Sam	ple	Field San	nple
Date Collected					11/16/200	)1	4/23/200	)2	7/16/200	03	8/20/200	)2	10/29/20	03	11/15/20	001
Chlorobenzene	39	ug/L	1000	ug/l	3700	ug/L	1100	ug/L	1100	ug/L	980	ug/L	1100	ug/L	790	ug/L
Chloroethane	2800	ug/L	NA		<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	<b>160</b> U	ug/L	51 U	ug/L	<b>20</b> U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Chloromethane	6.7	ug/L	NA		<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	450	ug/L	230	ug/L	220	ug/L	240	ug/L	180	ug/L	160	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	<b>160</b> U	ug/L	51 U	ug/L	5.0 U	ug/L	29 U	ug/L	5.0 U	ug/L	<b>26</b> U	ug/L
Dibromochloromethane	3.2	ug/L	NA		<b>160</b> U	ug/L	51 U	ug/L	20 U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	<b>160</b> U	ug/L	51 U	ug/L	20 U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	11 U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>10</b> J	ug/L
Styrene	890	ug/L	900	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	5.0 U	ug/L	29 U	ug/L	5.0 U	ug/L	<b>26</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	6900	ug/L	1200	ug/L	1200	ug/L	1000	ug/L	1100	ug/L	790	ug/L
Vinyl chloride	2	ug/L	2	ug/l	<b>160</b> U	ug/L	<b>51</b> U	ug/L	20 U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Xylene (m,p)	2200	ug/L	NA		<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Xylene (o)	3300	ug/L	NA		<b>160</b> U	ug/L	<b>51</b> U	ug/L	<b>20</b> U	ug/L	<b>29</b> U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	<b>160</b> U	ug/L	51 U	ug/L	20 U	ug/L	29 U	ug/L	<b>20</b> U	ug/L	<b>26</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	W-2	MW-202 MW202-10 Field Sam 10/29/200	003 ple	MW-203I MW203B-0 Field Sam 3/17/199	398 ple	MW-203 MW203B-0 Field Sam 4/23/200	)402 iple	MW-203 MW203B-0 Field Sam 7/18/200	703 ple	MW-203 MW203B-0 Field Sam 8/21/200	802 ple	MW-203 MW203B-1 Field Sam 10/31/20	1003 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	530	ug/L	200	ug/L	<b>290</b> J	ug/L	<b>46</b> J	ug/L	<b>310</b> J	ug/L	<b>140</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	1500	ug/L	950	ug/L	<b>1200</b> J	ug/L	<b>300</b> J	ug/L	1100	ug/L	<b>530</b> J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	34	ug/L	<b>19.0</b> J	ug/L	160 U	ug/L	4.5 J	ug/L	<b>24</b> J	ug/L	<b>11</b> J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	300	ug/L	<b>160</b> J	ug/L	<b>200</b> J	ug/L	<b>35</b> J	ug/L	<b>200</b> J	ug/L	<b>93</b> J	ug/L
3-Nitroaniline	NA		NA		14 U	ug/L	<b>25.0</b> UJ	ug/L	400 U	ug/L	2.7 U	ug/L	<b>550</b> U	ug/L	14 U	ug/L
4-Nitroaniline	NA		NA		14 U	ug/L	<b>25.0</b> UJ	ug/L	<b>400</b> UJ	ug/L	2.7 U	ug/L	<b>550</b> U	ug/L	14 U	ug/L
Aniline	NA		NA		41	ug/L	18.0 J	ug/L	<b>15</b> J	ug/L	<b>23</b> J	ug/L	550 U	ug/L	<b>34</b> U	ug/L
Naphthalene	15	ug/L	6000	ug/l	<b>11</b> J	ug/L	4.4 J	ug/L	160 U	ug/L	2.7 U	ug/L	<b>220</b> U	ug/L	14 U	ug/L
Nitrobenzene	200	ug/L	NA		14 U	ug/L	10.0 UJ	ug/L	160 U	ug/L	2.7 U	ug/L	<b>220</b> U	ug/L	<b>14</b> UJ	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		10.0 UJ	ug/L	_		_		_		-	
Pentachlorophenol	NA		NA		14 U	ug/L	25.0 UR	ug/L	<b>0.85</b> J	ug/L	5.4 UJ	ug/L	<b>550</b> U	ug/L	<b>57</b> UJ	ug/L
Volatile Organics							'				'		'			
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>40</b> U	ug/L	<b>50</b> U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	40 U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	40 U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	10 U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	40 U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	10 U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		410	ug/L	520	ug/L	260	ug/L	290	ug/L	470	ug/L	<b>350</b> J	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	40 U	ug/L	100 U	ug/L	110 U	ug/L	<b>10</b> U	ug/L	<b>200</b> U	ug/L	<b>10</b> U	ug/L
2-Hexanone	NA		NA		100 U	ug/L	100 U	ug/L	110 U	ug/L	<b>10</b> U	ug/L	<b>200</b> U	ug/L	<b>10</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		40 U	ug/L	100 U	ug/L	110 U	ug/L	<b>10</b> U	ug/L	<b>200</b> U	ug/L	<b>10</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	100 U	ug/L	100 U	ug/L	280 U	ug/L	<b>25</b> U	ug/L	<b>200</b> U	ug/L	<b>10</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	63	ug/L	62	ug/L	<b>22</b> U	ug/L	28	ug/L	43	ug/L	40	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>40</b> U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	10 U	ug/L	40 U	ug/L	10 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>40</b> U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	10 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>100</b> UJ	ug/L	<b>50</b> U	ug/L	22 U	ug/L	<b>10</b> UJ	ug/L	40 U	ug/L	<b>25</b> UJ	ug/L
Carbon Disulfide	56	ug/L	NA		40 U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	10 U	ug/L	40 U	ug/L	10 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	40 U	ug/L	50 U	ug/L	22 U	ug/L	10 U	ug/L	40 U	ug/L	10 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-202	2	MW-203	BB	MW-203	3B	MW-203	В	MW-203	В	MW-203	3B
Sample Identifier					MW202-10	003	MW203B-0	398	MW203B-0	0402	MW203B-0	703	MW203B-0	802	MW203B-1	1003
QC Type					Field Sam	ple	Field Sam	nple	Field Sam	nple	Field Sam	ple	Field Sam	ple	Field Sam	nple
Date Collected					10/29/200	)3	3/17/199	98	4/23/200	02	7/18/200	)3	8/21/200	)2	10/31/20	003
Chlorobenzene	39	ug/L	1000	ug/l	2400	ug/L	1900	ug/L	<b>11</b> J	ug/L	<b>660</b> J	ug/L	1400	ug/L	<b>1000</b> J	ug/L
Chloroethane	2800	ug/L	NA		40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	40 U	ug/L	<b>50</b> U	ug/L	22 U	ug/L	<b>10</b> U	ug/L	<b>40</b> U	ug/L	<b>10</b> U	ug/L
Chloromethane	6.7	ug/L	NA		40 U	ug/L	<b>50</b> U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	410	ug/L	520	ug/L	240	ug/L	290	ug/L	450	ug/L	<b>350</b> J	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	10 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	2.5 U	ug/L	40 U	ug/L	2.5 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	40 U	ug/L	50 U	ug/L	<b>36</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Styrene	890	ug/L	900	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> UJ	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>5.8</b> J	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	10 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	2.5 U	ug/L	40 U	ug/L	2.5 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	1900	ug/L	1600	ug/L	490	ug/L	940	ug/L	1300	ug/L	1200	ug/L
Vinyl chloride	2	ug/L	2	ug/l	40 U	ug/L	<b>18</b> J	ug/L	<b>22</b> U	ug/L	<b>8.4</b> J	ug/L	<b>12</b> J	ug/L	9.5 J	ug/L
Xylene (m,p)	2200	ug/L	NA		40 U	ug/L	-		<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Xylene (o)	3300	ug/L	NA		40 U	ug/L	-		<b>22</b> U	ug/L	<b>10</b> U	ug/L	40 U	ug/L	<b>10</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	40 U	ug/L	50 U	ug/L	<b>22</b> U	ug/L	10 U	ug/L	40 U	ug/L	<b>10</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	ЕРА Т	GC	MCP G	W-2	MW-204 MW204B-0 Field Sam 4/23/200	402 ple	MW-204l MW204B-0 Field Sam 7/17/200	703 ole	MW-204 MW204B-0 Field Sam 8/20/200	0802 nple	MW-204 MW204B- Field Sam 10/30/20	1003 nple	MW-302 MW302-03 Field Sam 3/11/199	398 ple	MW-30 MW302-0 Field San 4/20/20	0401 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>42</b> J	ug/L	9.9 J	ug/L	<b>16</b> J	ug/L	27	ug/L	<b>10.0</b> J	ug/L	20	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	<b>220</b> J	ug/L	<b>62</b> J	ug/L	<b>58</b> J	ug/L	170	ug/L	95.0	ug/L	560	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	<b>33</b> U	ug/L	5.2 UJ	ug/L	<b>2.7</b> J	ug/L	6.0	ug/L	4.0 J	ug/L	<b>8.7</b> J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>53</b> J	ug/L	<b>12</b> J	ug/L	<b>16</b> J	ug/L	39	ug/L	42.0	ug/L	<b>79</b> J	ug/L
3-Nitroaniline	NA		NA		<b>82</b> U	ug/L	5.2 U	ug/L	<b>26</b> U	ug/L	1.4 U	ug/L	26.0 U	ug/L	<b>26</b> U	ug/L
4-Nitroaniline	NA		NA		<b>82</b> UJ	ug/L	5.2 U	ug/L	<b>26</b> U	ug/L	<b>1.2</b> J	ug/L	26.0 U	ug/L	<b>26</b> U	ug/L
Aniline	NA		NA		<b>82</b> U	ug/L	5.2 UJ	ug/L	<b>26</b> U	ug/L	1.6 U	ug/L	<b>450</b> J	ug/L	<b>630</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	<b>33</b> U	ug/L	5.2 U	ug/L	<b>10</b> U	ug/L	1.4 U	ug/L	58.0	ug/L	<b>90</b> J	ug/L
Nitrobenzene	200	ug/L	NA		<b>88</b> J	ug/L	8.2	ug/L	<b>16</b> J	ug/L	55	ug/L	11.0 U	ug/L	<b>10</b> U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		-		-		11.0 U	ug/L	-	
Pentachlorophenol	NA		NA		0.14 J	ug/L	<b>10</b> UJ	ug/L	<b>26</b> U	ug/L	1.4 U	ug/L	25.0 U	ug/L	<b>26</b> U	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	7.3 U	ug/L	2.0 UJ	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		54	ug/L	46	ug/L	23	ug/L	52	ug/L	82	ug/L	130	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>36</b> U	ug/L	2.0 U	ug/L	<b>21</b> U	ug/L	4.0 U	ug/L	<b>65</b> U	ug/L	<b>150</b> U	ug/L
2-Hexanone	NA		NA		<b>36</b> U	ug/L	2.0 U	ug/L	<b>21</b> U	ug/L	4.0 U	ug/L	<b>65</b> U	ug/L	<b>150</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>36</b> U	ug/L	2.0 U	ug/L	<b>21</b> U	ug/L	4.0 U	ug/L	<b>65</b> U	ug/L	<b>150</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	84 U	ug/L	5.0 U	ug/L	<b>21</b> U	ug/L	4.0 U	ug/L	<b>65</b> U	ug/L	<b>150</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	<b>7.3</b> U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	50	ug/L	75	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>7.3</b> U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	32 U	ug/L	<b>29</b> U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>7.3</b> U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>7.3</b> U	ug/L	5.0 UJ	ug/L	4.2 U	ug/L	<b>10</b> UJ	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Carbon Disulfide	56	ug/L	NA		7.3 U	ug/L	2.0 UJ	ug/L	4.2 U	ug/L	4.0 U	ug/L	32 U	ug/L	29 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	32 U	ug/L	29 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name		GC	MCP G	3W-2	MW-204	В	MW-204	3	MW-204	₽B	MW-204	1B	MW-302	2	MW-30	2
Sample Identifier					MW204B-04	402	MW204B-0	703	MW204B-0	0802	MW204B-	1003	MW302-0	398	MW302-0	401
QC Type					Field Samp	ple	Field Sam	ole	Field Sam	nple	Field San	nple	Field Sam	ple	Field San	nple
Date Collected					4/23/2002	2	7/17/200	3	8/20/200	02	10/30/20	03	3/11/199	8	4/20/20	01
Chlorobenzene	39	ug/L	1000	ug/l	100	ug/L	<b>55</b> J	ug/L	31	ug/L	92	ug/L	630	ug/L	600	ug/L
Chloroethane	2800	ug/L	NA		7.3 U	ug/L	2.0 UJ	ug/L	4.2 U	ug/L	4.0 U	ug/L	32 U	ug/L	<b>29</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	7.3 U	ug/L	2.0 U	ug/L	<b>4.2</b> U	ug/L	4.0 U	ug/L	32 U	ug/L	<b>29</b> U	ug/L
Chloromethane	6.7	ug/L	NA		7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	51	ug/L	46	ug/L	22	ug/L	52	ug/L	82	ug/L	130	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	7.3 U	ug/L	0.50 ∪	ug/L	4.2 U	ug/L	1.0 U	ug/L	32 U	ug/L	29 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>10</b> U	ug/L	<b>2.0</b> UJ	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Styrene	890	ug/L	900	ug/l	7.3 U	ug/L	<b>2.0</b> UJ	ug/L	<b>4.2</b> U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	7.3 U	ug/L	2.0 U	ug/L	<b>4.2</b> U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	7.3 U	ug/L	1.0 J	ug/L	<b>4.2</b> U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	7.3 U	ug/L	0.50 ∪	ug/L	4.2 U	ug/L	1.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	320	ug/L	200	ug/L	130	ug/L	310	ug/L	960	ug/L	760	ug/L
Vinyl chloride	2	ug/L	2	ug/l	7.3 U	ug/L	1.1 J	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L
Xylene (m,p)	2200	ug/L	NA		7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	-		<b>29</b> U	ug/L
Xylene (o)	3300	ug/L	NA		7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	-		<b>29</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	7.3 U	ug/L	2.0 U	ug/L	4.2 U	ug/L	4.0 U	ug/L	<b>32</b> U	ug/L	<b>29</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	W-2	MW-302 MW302-04 Field Sam 4/24/200	102 ple	MW-302 MW302-04 Field Sam 4/27/199	199 ple	MW-302 MW302-06 Field Sam 6/23/200	00-2 iple	MW-302 MW302-07 Field Sam 7/18/200	703 ple	MW-302 MW302-08 Field Sam 8/22/200	302 ple	MW-30 MW302-0 Field San 9/18/200	900 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>16</b> J	ug/L	12.0 J	ug/L	18	ug/L	<b>7.6</b> J	ug/L	<b>22</b> J	ug/L	<b>19</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	<b>480</b> J	ug/L	430	ug/L	580	ug/L	<b>370</b> J	ug/L	630	ug/L	620	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	98 U	ug/L	6.0 J	ug/L	9.4 J	ug/L	3.0 J	ug/L	8.5 J	ug/L	9.1 J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>74</b> J	ug/L	<b>62.0</b> J	ug/L	68	ug/L	<b>33</b> J	ug/L	<b>99</b> J	ug/L	<b>77</b> J	ug/L
3-Nitroaniline	NA		NA		240 U	ug/L	180 U	ug/L	<b>25</b> U	ug/L	2.6 U	ug/L	<b>260</b> U	ug/L	<b>26</b> U	ug/L
4-Nitroaniline	NA		NA		<b>240</b> UJ	ug/L	180 U	ug/L	<b>25</b> UJ	ug/L	2.6 U	ug/L	<b>260</b> U	ug/L	<b>26</b> U	ug/L
Aniline	NA		NA		620	ug/L	440	ug/L	900 J	ug/L	350 J	ug/L	730	ug/L	640	ug/L
Naphthalene	15	ug/L	6000	ug/l	<b>87</b> J	ug/L	74.0	ug/L	68	ug/L	38	ug/L	110 J	ug/L	82	ug/L
Nitrobenzene	200	ug/L	NA		<b>98</b> U	ug/L	72.0 U	ug/L	3.0 J	ug/L	2.6 U	ug/L	100 U	ug/L	<b>3.3</b> J	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		_		-		_		-	
Pentachlorophenol	NA		NA		0.44	ug/L	180 U	ug/L	<b>25</b> U	ug/L	5.2 UJ	ug/L	<b>260</b> U	ug/L	0.22	ug/L
Volatile Organics				'			'				'					
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> UJ	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		84	ug/L	88	ug/L	140	ug/L	89	ug/L	150	ug/L	110	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>120</b> UJ	ug/L	100 U	ug/L	140 U	ug/L	<b>10</b> U	ug/L	<b>76</b> U	ug/L	<b>110</b> U	ug/L
2-Hexanone	NA		NA		<b>120</b> UJ	ug/L	100 U	ug/L	140 U	ug/L	<b>10</b> U	ug/L	<b>76</b> U	ug/L	<b>110</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		120 U	ug/L	100 U	ug/L	140 U	ug/L	<b>10</b> U	ug/L	<b>76</b> U	ug/L	<b>110</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	120 U	ug/L	<b>66</b> J	ug/L	140 U	ug/L	<b>25</b> U	ug/L	<b>76</b> U	ug/L	<b>42</b> J	ug/L
Benzene	5	ug/L	2000	ug/l	78	ug/L	49	ug/L	76	ug/L	61	ug/L	79	ug/L	52	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	10 U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>23</b> U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>23</b> U	ug/L	<b>20</b> UJ	ug/L	<b>28</b> UJ	ug/L	<b>10</b> UJ	ug/L	<b>15</b> UJ	ug/L	<b>22</b> U	ug/L
Carbon Disulfide	56	ug/L	NA		<b>23</b> U	ug/L	20 U	ug/L	28 U	ug/L	10 U	ug/L	15 U	ug/L	22 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	23 U	ug/L	20 U	ug/L	28 U	ug/L	10 U	ug/L	15 U	ug/L	22 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name		GC	MCP G	SW-2	MW-302	2	MW-302	2	MW-30	2	MW-30	2	MW-30	2	MW-30	2
Sample Identifier					MW302-04	102	MW302-04		MW302-06	00-2	MW302-0	703	MW302-0	302	MW302-0	900
QC Type					Field Sam	ple	Field Sam	ple	Field Sam	nple	Field Sam	ıple	Field Sam	ple	Field Sam	nple
Date Collected					4/24/200	2	4/27/199	9	6/23/200	00	7/18/200	)3	8/22/200	)2	9/18/200	00
Chlorobenzene	39	ug/L	1000	ug/l	540	ug/L	580	ug/L	620	ug/L	<b>580</b> J	ug/L	630	ug/L	470	ug/L
Chloroethane	2800	ug/L	NA		23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	<b>22</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	22 U	ug/L
Chloromethane	6.7	ug/L	NA		23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	15 U	ug/L	<b>22</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	79	ug/L	91	ug/L	130	ug/L	89	ug/L	140	ug/L	100	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	2.5 U	ug/L	15 U	ug/L	22 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	22 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>3.5</b> J	ug/L	<b>22</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	23 U	ug/L	<b>15</b> J	ug/L	41	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>13</b> J	ug/L
Styrene	890	ug/L	900	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> UJ	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	2.5 U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	690	ug/L	<b>910</b> J	ug/L	820	ug/L	860	ug/L	<b>720</b> J	ug/L	650	ug/L
Vinyl chloride	2	ug/L	2	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	<b>10</b> U	ug/L	<b>15</b> U	ug/L	<b>22</b> U	ug/L
Xylene (m,p)	2200	ug/L	NA		23 U	ug/L	-		<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	<b>22</b> U	ug/L
Xylene (o)	3300	ug/L	NA		23 U	ug/L	-		<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	<b>22</b> U	ug/L
Xylenes	2200	ug/L	6000	ug/l	23 U	ug/L	<b>20</b> U	ug/L	<b>28</b> U	ug/L	10 U	ug/L	15 U	ug/L	22 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	W-2	MW-302 MW302-10 Field Sam 10/30/200	003 ple	MW-302 MW302-10 Field Sam 10/4/199	)99 ple	MW-30 MW302-1 Field Sam 11/15/20	101 nple	MW-304 MW304B-0 Field Sam 1/4/199	)199 iple	MW-304B-03 MW304B-03 Field Samp 3/17/199	398 ole	MW-304 MW304B-0 Field Sam 4/24/200	0402 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	15	ug/L	17.0	ug/L	22	ug/L	11 U	ug/L	2.5 J	ug/L	<b>29</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	490	ug/L	630	ug/L	840	ug/L	<b>8</b> J	ug/L	32.0	ug/L	<b>300</b> J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	6.7	ug/L	8.7 J	ug/L	<b>9.7</b> J	ug/L	11 UJ	ug/L	0.96 J	ug/L	48 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	73	ug/L	86.0 J	ug/L	<b>110</b> J	ug/L	11 U	ug/L	6.0 J	ug/L	<b>65</b> J	ug/L
3-Nitroaniline	NA		NA		5.1 U	ug/L	26.0 U	ug/L	25 U	ug/L	<b>28</b> UJ	ug/L	26.0 U	ug/L	120 U	ug/L
4-Nitroaniline	NA		NA		5.1 U	ug/L	26.0 U	ug/L	25 U	ug/L	28 U	ug/L	26.0 U	ug/L	<b>120</b> UJ	ug/L
Aniline	NA		NA		360	ug/L	1000	ug/L	700	ug/L	<b>6</b> J	ug/L	2.8 J	ug/L	48 U	ug/L
Naphthalene	15	ug/L	6000	ug/l	66	ug/L	110 J	ug/L	<b>110</b> J	ug/L	11 U	ug/L	10.0 U	ug/L	48 U	ug/L
Nitrobenzene	200	ug/L	NA		5.1 U	ug/L	7.9 J	ug/L	10 U	ug/L	11 U	ug/L	13.0	ug/L	<b>56</b> J	ug/L
N-Nitroso-di-n-propylamine	NA	İ	NA		-		-		_		11 U	ug/L	10.0 U	ug/L	-	
Pentachlorophenol	NA		NA		5.1 UJ	ug/L	0.24 J	ug/L	0.30	ug/L	0.24 U	ug/L	26.0 UR	ug/L	0.37	ug/L
Volatile Organics		-					'				'		'			
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1	ug/L	5.0 U	ug/L	11 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		110	ug/L	78	ug/L	98	ug/L	-		26	ug/L	260	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	10 U	ug/L	4.3 U	ug/L	20 U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	10 U	ug/L	<b>22</b> U	ug/L	100 U	ug/L	5 U	ug/L	10 U	ug/L	<b>56</b> UJ	ug/L
2-Hexanone	NA		NA		10 U	ug/L	<b>22</b> U	ug/L	100 U	ug/L	4 U	ug/L	10 U	ug/L	<b>56</b> UJ	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		10 U	ug/L	<b>22</b> U	ug/L	100 U	ug/L	<b>3</b> U	ug/L	10 U	ug/L	<b>56</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	10 U	ug/L	<b>22</b> U	ug/L	100 U	ug/L	5 U	ug/L	10 U	ug/L	<b>56</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	74	ug/L	52	ug/L	67	ug/L	<b>0.90</b> J	ug/L	2.6 J	ug/L	<b>5.9</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Bromomethane	2	ug/L	2	ug/l	<b>25</b> UJ	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Carbon Disulfide	56	ug/L	NA		<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	6W-2	MW-302		MW-302		MW-30	_	MW-304	_	MW-304	_	MW-304	-
Sample Identifier					MW302-10		MW302-10		MW302-1		MW304B-0		MW304B-0		MW304B-0	-
QC Type					Field Samp		Field Sam	•	Field Sam	•	Field Sam		Field Sam		Field Sam	•
Date Collected					10/30/200	13	10/4/199	9	11/15/20	01	1/4/199	9	3/17/199	8	4/24/200	02
Chlorobenzene	39	ug/L	1000	ug/l	580	ug/L	490	ug/L	530	ug/L	9	ug/L	43	ug/L	250	ug/L
Chloroethane	2800	ug/L	NA		<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Chloroform	80	ug/L	400	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Chloromethane	6.7	ug/L	NA		<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	110	ug/L	77	ug/L	98	ug/L	6	ug/L	26	ug/L	250	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	2.5 U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	<b>10</b> U	ug/L	1.2 J	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>10</b> U	ug/L	3.6 J	ug/L	<b>14</b> J	ug/L	4 U	ug/L	5.0 U	ug/L	11 U	ug/L
Styrene	890	ug/L	900	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	<b>10</b> U	ug/L	1.1 J	ug/L	<b>20</b> U	ug/L	<b>0.50</b> J	ug/L	5.0 U	ug/L	11 U	ug/L
Toluene	150	ug/L	6000	ug/l	<b>10</b> U	ug/L	1.8 J	ug/L	<b>20</b> U	ug/L	0.70 J	ug/L	5.0 U	ug/L	11 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	2.5 U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1.0 U	ug/L	5.0 U	ug/L	11 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	870	ug/L	690	ug/L	610	ug/L	10	ug/L	86	ug/L	330	ug/L
Vinyl chloride	2	ug/L	2	ug/l	<b>10</b> U	ug/L	4.3 U	ug/L	<b>20</b> U	ug/L	1 J	ug/L	5.0 U	ug/L	13	ug/L
Xylene (m,p)	2200	ug/L	NA		<b>10</b> U	ug/L	-		<b>20</b> U	ug/L	-		-		11 U	ug/L
Xylene (o)	3300	ug/L	NA		<b>10</b> U	ug/L	-		<b>20</b> U	ug/L	-		-		11 U	ug/L
Xylenes	2200	ug/L	6000	ug/l	10 U	ug/L	1.4 J	ug/L	<b>20</b> U	ug/L	0.70 J	ug/L	5.0 U	ug/L	11 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP (	GW-2	MW-304 MW304B-0 Field Sam 4/27/199	499 ple	MW-304 MW304B-0 Field Sam 7/17/200	703 ple	MW-304 MW304B-0 Field Sam 8/21/200	0802 nple	MW-304 MW304B-1 Field Sam 10/30/200	003 ple	MW-304 MW304B-7 Field Sam 11/13/20	1101 iple	MW-305 MW305B- Field San 1/5/199	0199 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	0.90 J	ug/L	<b>13</b> J	ug/L	<b>37</b> J	ug/L	16	ug/L	<b>26</b> J	ug/L	11 U	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	5.0 J	ug/L	<b>210</b> J	ug/L	380	ug/L	180	ug/L	290	ug/L	11 U	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	0.60 J	ug/L	4.2 J	ug/L	<b>13</b> J	ug/L	5.2	ug/L	9.8 J	ug/L	11 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	2.0 J	ug/L	30 J	ug/L	84	ug/L	36	ug/L	<b>41</b> J	ug/L	11 U	ug/L
3-Nitroaniline	NA		NA		27.0 U	ug/L	1.5 U	ug/L	150 U	ug/L	2.9 U	ug/L	26 U	ug/L	<b>28</b> U	ug/L
4-Nitroaniline	NA		NA		27.0 U	ug/L	1.5 U	ug/L	150 U	ug/L	2.9 U	ug/L	26 U	ug/L	28 U	ug/L
Aniline	NA		NA		27.0 U	ug/L	3.8 J	ug/L	150 U	ug/L	7.4 U	ug/L	6.6 J	ug/L	11 U	ug/L
Naphthalene	15	ug/L	6000	ug/l	11.0 U	ug/L	1.5 U	ug/L	<b>62</b> U	ug/L	2.9 U	ug/L	0.74 J	ug/L	11 U	ug/L
Nitrobenzene	200	ug/L	NA		11.0 U	ug/L	36	ug/L	91	ug/L	30	ug/L	<b>46</b> J	ug/L	11 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		_		-		-		-		-		11 U	ug/L
Pentachlorophenol	NA		NA		27.0 U	ug/L	3.0 UJ	ug/L	150 U	ug/L	2.9 UJ	ug/L	0.25	ug/L	0.24 U	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		12	ug/L	190	ug/L	460	ug/L	140	ug/L	400	ug/L	4	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	1.0 U	ug/L	<b>10</b> U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	5.0 U	ug/L	<b>10</b> U	ug/L	110 U	ug/L	4.0 U	ug/L	<b>66</b> U	ug/L	<b>5</b> U	ug/L
2-Hexanone	NA		NA		5.0 U	ug/L	<b>10</b> U	ug/L	110 U	ug/L	4.0 U	ug/L	<b>66</b> U	ug/L	4 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		5.0 U	ug/L	<b>10</b> U	ug/L	110 U	ug/L	4.0 U	ug/L	<b>66</b> U	ug/L	<b>3</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	2.8 J	ug/L	<b>25</b> U	ug/L	110 U	ug/L	4.0 U	ug/L	84	ug/L	<b>5</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	1.0 U	ug/L	<b>5.3</b> J	ug/L	<b>7.5</b> J	ug/L	4.5	ug/L	<b>8.1</b> J	ug/L	1.0 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		1.0 U	ug/L	10 U	ug/L	22 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	1.0 U	ug/L	10 U	ug/L	22 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Bromomethane	2	ug/L	2	ug/l	1.0 UJ	ug/L	<b>10</b> UJ	ug/L	22 U	ug/L	<b>10</b> UJ	ug/L	<b>13</b> U	ug/L	2.0 U	ug/L
Carbon Disulfide	56	ug/L	NA		1.0 U	ug/L	10 U	ug/L	22 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	1.0 U	ug/L	10 U	ug/L	22 U	ug/L	4.0 U	ug/L	13 U	ug/L	1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name		GC	MCP G	W-2	MW-304	В	MW-304	В	MW-304	łВ	MW-304	łВ	MW-304	В	MW-305	5B
Sample Identifier					MW304B-0		MW304B-0	703	MW304B-0	0802	MW304B-	1003	MW304B-1	101	MW305B-0	0199
QC Type					Field Sam	ple	Field Sam	ple	Field Sam	nple	Field Sam	nple	Field Sam	ple	Field Sam	nple
Date Collected					4/27/199	9	7/17/200	3	8/21/200	02	10/30/20	03	11/13/20	01	1/5/199	9
Chlorobenzene	39	ug/L	1000	ug/l	4.4	ug/L	<b>190</b> J	ug/L	370	ug/L	140	ug/L	330	ug/L	3	ug/L
Chloroethane	2800	ug/L	NA		1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	2.0 U	ug/L
Chloroform	80	ug/L	400	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Chloromethane	6.7	ug/L	NA		1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	2.0 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	13	ug/L	190	ug/L	440	ug/L	140	ug/L	400	ug/L	4	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	1.0 U	ug/L	2.5 U	ug/L	22 U	ug/L	1.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	1.0 U	ug/L	5.4 UJ	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>7.0</b> J	ug/L	<b>3</b> U	ug/L
Styrene	890	ug/L	900	ug/l	1.0 U	ug/L	<b>10</b> UJ	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Toluene	150	ug/L	6000	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	<b>2.3</b> J	ug/L	<b>13</b> U	ug/L	2.0 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	1.0 U	ug/L	2.5 U	ug/L	<b>22</b> U	ug/L	1.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	<b>3.4</b> J	ug/L	280	ug/L	600	ug/L	200	ug/L	340	ug/L	6	ug/L
Vinyl chloride	2	ug/L	2	ug/l	0.59 J	ug/L	12	ug/L	<b>11</b> J	ug/L	6.0	ug/L	46	ug/L	2.0 U	ug/L
Xylene (m,p)	2200	ug/L	NA		-		<b>10</b> U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	13 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		-		<b>10</b> U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	13 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	1.0 U	ug/L	10 U	ug/L	<b>22</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

Nyanza Superfund Site

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	SW-2	MW-305I MW305B-0 Field Sam 3/17/199	398 ole	MW-305l MW305B-0 Field Sam 4/19/200	401 ole	MW-305 MW305B-0 Field Sam 4/26/199	0499 nple	MW-305 MW305B-0 Field Sam 6/20/200	0600 nple	MW-305 MW305B-0 Field Sam 9/15/200	900 ple	MW-305 MW305B- Field San 10/4/199	1099 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	20.0	ug/L	4.4 J	ug/L	5.0 J	ug/L	5.8 J	ug/L	10 U	ug/L	1.1 J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	59.0	ug/L	29	ug/L	10.0 J	ug/L	20	ug/L	10 U	ug/L	2.9 J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	2.2 J	ug/L	10 U	ug/L	11.0 U	ug/L	10 U	ug/L	10 U	ug/L	10.0 U	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	13.0	ug/L	6.2 J	ug/L	3.0 J	ug/L	4.4 J	ug/L	10 U	ug/L	0.71 J	ug/L
3-Nitroaniline	NA		NA		26.0 U	ug/L	26 U	ug/L	27.0 U	ug/L	<b>26</b> U	ug/L	26 U	ug/L	26.0 U	ug/L
4-Nitroaniline	NA		NA		26.0 U	ug/L	26 U	ug/L	27.0 U	ug/L	26 U	ug/L	26 U	ug/L	26.0 U	ug/L
Aniline	NA		NA		1.2 J	ug/L	R	ug/L	27.0 U	ug/L	26 U	ug/L	26 U	ug/L	26.0 U	ug/L
Naphthalene	15	ug/L	6000	ug/l	10.0 U	ug/L	10 U	ug/L	11.0 U	ug/L	<b>10</b> U	ug/L	10 U	ug/L	11.0 U	ug/L
Nitrobenzene	200	ug/L	NA		5.4 J	ug/L	16	ug/L	11 U	ug/L	2.7 J	ug/L	10 U	ug/L	1.1 J	ug/L
N-Nitroso-di-n-propylamine	NA		NA		10.0 U	ug/L	-		-		-		-		-	
Pentachlorophenol	NA		NA		26.0 UR	ug/L	26 U	ug/L	27.0 U	ug/L	26 U	ug/L	0.098 U	ug/L	0.036 J	ug/L
Volatile Organics							'						'		'	
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 UJ	ug/L	1.0 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		48	ug/L	<b>13</b> J	ug/L	11	ug/L	27	ug/L	<b>0.89</b> J	ug/L	1.6	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>10</b> U	ug/L	<b>7.5</b> UJ	ug/L	5.0 U	ug/L	6.5 U	ug/L	5.0 U	ug/L	5.0 U	ug/L
2-Hexanone	NA		NA		<b>10</b> U	ug/L	<b>7.5</b> UJ	ug/L	5.0 U	ug/L	6.5 U	ug/L	5.0 U	ug/L	5.0 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>10</b> U	ug/L	<b>7.5</b> UJ	ug/L	5.0 U	ug/L	6.5 U	ug/L	5.0 U	ug/L	5.0 U	ug/L
Acetone	22000	ug/L	50000	ug/l	<b>10</b> U	ug/L	<b>7.5</b> UJ	ug/L	5.0 U	ug/L	6.5 U	ug/L	5.0 U	ug/L	5.0 U	ug/L
Benzene	5	ug/L	2000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	<b>0.34</b> J	ug/L	1.0 U	ug/L	1.0 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	<b>1.3</b> U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Bromomethane	2	ug/L	2	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> UJ	ug/L	<b>1.3</b> U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Carbon Disulfide	56	ug/L	NA		5.0 U	ug/L	1.5 UJ	ug/L	<b>1.0</b> U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-305	3	MW-305B		MW-305	iΒ	MW-305	iΒ	MW-305	В	MW-305	δB
Sample Identifier					MW305B-03	398	MW305B-040	01	MW305B-0	0499	MW305B-0	0600	MW305B-0	900	MW305B-1	1099
QC Type					Field Samp	ole	Field Sampl	le	Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	nple
Date Collected					3/17/1998	8	4/19/2001		4/26/199	99	6/20/200	00	9/15/200	0	10/4/199	99
Chlorobenzene	39	ug/L	1000	ug/l	32	ug/L	14 J	ug/L	4.4	ug/L	17	ug/L	0.92 J	ug/L	1.4	ug/L
Chloroethane	2800	ug/L	NA		5.0 U	ug/L		ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Chloroform	80	ug/L	400	ug/l	5.0 U	ug/L		ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Chloromethane	6.7	ug/L	NA		5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	48	ug/L	<b>13</b> J	ug/L	11	ug/L	25	ug/L	<b>0.85</b> J	ug/L	1.6	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 UJ	ug/L	1.0 U	ug/L
Styrene	890	ug/L	900	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	0.37 J	ug/L	1.0 U	ug/L	1.0 U	ug/L
Toluene	150	ug/L	6000	ug/l	5.0 U	ug/L	<b>0.72</b> J	ug/L	1.0 U	ug/L	1.3 U	ug/L	1 U	ug/L	1.0 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 UJ	ug/L	1.0 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	71	ug/L	<b>44</b> J	ug/L	<b>12</b> J	ug/L	39	ug/L	3.3	ug/L	4.8	ug/L
Vinyl chloride	2	ug/L	2	ug/l	5.0 U	ug/L	<b>1.5</b> UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	1.0 U	ug/L	1.0 U	ug/L
Xylene (m,p)	2200	ug/L	NA		-		<b>1.5</b> UJ	ug/L	-		1.3 U	ug/L	1.0 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		-		<b>1.5</b> UJ	ug/L	-		1.3 U	ug/L	1.0 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	5.0 U	ug/L	1.5 UJ	ug/L	1.0 U	ug/L	1.3 U	ug/L	-		1.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type	EPA T	GC	MCP G	6W-2	MW-405 MW405B-0 Field Sam	199	MW-405 MW405B-0 Field Sam	398	MW-405 MW405B-0 Field Sam	401	MW-405 MW405B-0 Field Sam	402	MW-405 MW405B-0 Field Sam	)499	MW-405 MW405B-0 Field Sam	0600
Date Collected					1/4/1999	)	3/10/199	8	4/20/200	)1	4/24/200	2	4/26/199	99	6/19/200	00
Semivolatile Organics																
1.2.4-Trichlorobenzene	340	ug/L	10000	ug/l	220 U	ug/L	92.0 J	ug/L	150	ug/L	200 J	ug/L	160 J	ug/L	120 J	ug/L
1.2-Dichlorobenzene	260	ug/L	10000	ug/l	450	ug/L	1800 J	ug/L	2300	ug/L	2200	ug/L	2000 J	ug/L	1800	ug/L
1.3-Dichlorobenzene	83	ug/L	10000	ug/l	220 U.J	ug/L	530 U	ug/L	32.J	ug/L	40 U	ug/L	33.0 J	ug/L	26.J	ug/L
1.4-Dichlorobenzene	820	ug/L	30000	ug/l	220 U	ug/L	310 J	ug/L	360	ug/L	390	ug/L	360 J	ug/L	300	ug/L
3-Nitroaniline	NA		NA		550 UJ	ug/L	1300 UJ	ug/L	180 U	ug/L	100 U	ug/L	270 U	ug/L	510 U	ug/L
4-Nitroaniline	NA		NA		550 U	ug/L	1300 UJ	ug/L	180 U	ug/L	100 U	ug/L	270 U	ug/L	510 UJ	ug/L
Aniline	NA		NA		1900 J	ug/L	7100 J	ug/L	3400 J	ug/L	6600	ug/L	4600 J	ug/L	8500	ug/L
Naphthalene	15	ug/L	6000	ug/l	<b>220</b> U	ug/L	<b>240</b> J	ug/L	270	ug/L	280 J	ug/L	280 J	ug/L	<b>230</b> J	ug/L
Nitrobenzene	200	ug/L	NA		220 U	ug/L	530 UJ	ug/L	<b>72</b> U	ug/L	40 U	ug/L	110 U	ug/L	-	
N-Nitroso-di-n-propylamine	NA		NA		<b>220</b> U	ug/L	530 U	ug/L	-		-		-		-	
Pentachlorophenol	NA		NA		0.24 U	ug/L	1300 U	ug/L	180 U	ug/L	0.57 J	ug/L	270 U	ug/L	510 UJ	ug/L
Volatile Organics											'					
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	<b>140</b> U	ug/L	120 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	<b>120</b> U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	6	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	0.90 J	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		-		100 J	ug/L	<b>160</b> J	ug/L	160	ug/L	<b>120</b> J	ug/L	140	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>5</b> U	ug/L	290 U	ug/L	<b>820</b> U	ug/L	800 UJ	ug/L	710 U	ug/L	<b>630</b> U	ug/L
2-Hexanone	NA		NA		4 U	ug/L	290 U	ug/L	<b>820</b> U	ug/L	800 UJ	ug/L	710 U	ug/L	<b>630</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>3</b> U	ug/L	290 U	ug/L	<b>820</b> U	ug/L	800 U	ug/L	710 U	ug/L	<b>630</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	5	ug/L	290 U	ug/L	<b>820</b> U	ug/L	800 U	ug/L	710 U	ug/L	<b>630</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	51	ug/L	<b>57</b> J	ug/L	<b>54</b> J	ug/L	<b>54</b> J	ug/L	<b>59</b> J	ug/L	<b>57</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	<b>140</b> U	ug/L	120 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> UJ	ug/L	<b>160</b> U	ug/L	<b>140</b> U	ug/L	120 UJ	ug/L
Bromomethane	2	ug/L	2	ug/l	2.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	<b>140</b> UJ	ug/L	120 U	ug/L
Carbon Disulfide	56	ug/L	NA		1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	<b>140</b> U	ug/L	120 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	<b>120</b> UJ	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	SW-2	MW-405 MW405B-0 Field Sam 1/4/1999	199 ple	MW-405 MW405B-0 Field Sam 3/10/199	)398 iple	MW-405 MW405B-0 Field Sam 4/20/200	0401 nple	MW-405 MW405B-0 Field Sam 4/24/200	0402 nple	MW-405 MW405B-0 Field Sam 4/26/199	)499 iple	MW-405 MW405B-0 Field Sam 6/19/200	)600 ple
Chlorobenzene	39	ug/L	1000	ug/l	5600	ug/L	3600 J	ug/L	3500	ug/L	3500	ug/L	4200	ug/L	3600 J	ug/L
Chloroethane	2800	ug/L	NA		2.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Chloroform	80	ug/L	400	ug/l	0.6 J	ug/L	<b>150</b> U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Chloromethane	6.7	ug/L	NA		2.0 U	ug/L	<b>150</b> U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	120	ug/L	<b>100</b> J	ug/L	<b>160</b> J	ug/L	160	ug/L	<b>120</b> J	ug/L	130	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	1.0 U	ug/L	<b>150</b> U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		1.0 U	ug/L	<b>150</b> U	ug/L	<b>160</b> U	ug/L	<b>160</b> U	ug/L	140 U	ug/L	120 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	2	ug/L	150 U	ug/L	160 U	ug/L	160 U	ug/L	140 U	ug/L	130 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>4</b> U	ug/L	150 U	ug/L	160 U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Styrene	890	ug/L	900	ug/l	1.0 U	ug/L	150 U	ug/L	160 U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	2	ug/L	<b>150</b> U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Toluene	150	ug/L	6000	ug/l	13	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	2	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	1.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	7600	ug/L	<b>4600</b> J	ug/L	4800	ug/L	5000	ug/L	<b>5100</b> J	ug/L	<b>4400</b> J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	2.0 U	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	<b>120</b> UJ	ug/L
Xylene (m,p)	2200	ug/L	NA		-		-		<b>160</b> U	ug/L	160 U	ug/L	-		120 U	ug/L
Xylene (o)	3300	ug/L	NA		-		-		<b>160</b> U	ug/L	<b>160</b> U	ug/L	-		120 U	ug/L
Xylenes	2200	ug/L	6000	ug/l	20	ug/L	150 U	ug/L	<b>160</b> U	ug/L	160 U	ug/L	140 U	ug/L	120 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-405		MW-405		MW-405		MW-405		MW-405		MW-405	
Sample Identifier					MW405B-0	703	MW405B-0	802	MW405B-0	900	MW405B-1	003	MW405B-1	1099	MW405B-1	1101
QC Type					Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	nple
Date Collected					7/18/200	3	8/21/200	)2	9/14/200	00	10/30/200	03	10/4/199	99	11/16/20	01
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>67</b> J	ug/L	1500 U	ug/L	140	ug/L	88	ug/L	<b>150</b> J	ug/L	<b>96</b> J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	<b>1700</b> J	ug/L	2200	ug/L	2200	ug/L	1200	ug/L	2500	ug/L	<b>760</b> J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	<b>13</b> J	ug/L	1500 U	ug/L	32	ug/L	<b>17</b> J	ug/L	28.0	ug/L	<b>19</b> J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>160</b> J	ug/L	<b>370</b> J	ug/L	390	ug/L	220	ug/L	<b>400</b> J	ug/L	270	ug/L
3-Nitroaniline	NA		NA		2.5 U	ug/L	3800 U	ug/L	<b>56</b> U	ug/L	<b>30</b> U	ug/L	26.0 U	ug/L	<b>280</b> UJ	ug/L
4-Nitroaniline	NA		NA		2.5 U	ug/L	3800 U	ug/L	<b>56</b> UJ	ug/L	<b>30</b> U	ug/L	26.0 U	ug/L	<b>280</b> UJ	ug/L
Aniline	NA		NA		<b>220</b> J	ug/L	8100	ug/L	5600	ug/L	710	ug/L	9600	ug/L	8700	ug/L
Naphthalene	15	ug/L	6000	ug/l	100	ug/L	<b>290</b> J	ug/L	280	ug/L	170	ug/L	<b>300</b> J	ug/L	<b>210</b> J	ug/L
Nitrobenzene	200	ug/L	NA		2.5 U	ug/L	1500 U	ug/L	<b>22</b> U	ug/L	<b>30</b> U	ug/L	10.0 U	ug/L	110 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		-		-		-		-		-		-	
Pentachlorophenol	NA		NA		5.0 UJ	ug/L	3800 U	ug/L	0.42 J	ug/L	<b>120</b> UJ	ug/L	0.40 J	ug/L	0.34	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> UJ	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		180	ug/L	190	ug/L	<b>140</b> J	ug/L	200	ug/L	<b>110</b> J	ug/L	<b>160</b> J	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	100 U	ug/L	120 U	ug/L	<b>140</b> U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>72</b> J	ug/L	620 U	ug/L	<b>710</b> U	ug/L	<b>90</b> J	ug/L	850 U	ug/L	<b>680</b> U	ug/L
2-Hexanone	NA		NA		100 U	ug/L	<b>620</b> U	ug/L	<b>710</b> U	ug/L	100 U	ug/L	850 U	ug/L	<b>680</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		100 U	ug/L	<b>620</b> U	ug/L	<b>710</b> U	ug/L	100 U	ug/L	850 U	ug/L	<b>680</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	92 U	ug/L	<b>620</b> U	ug/L	<b>440</b> J	ug/L	100 U	ug/L	850 U	ug/L	<b>680</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	100 U	ug/L	<b>56</b> J	ug/L	<b>55</b> J	ug/L	<b>51</b> J	ug/L	<b>56</b> J	ug/L	<b>55</b> J	ug/L
Bromodichloromethane	2.1	ug/L	NA		<b>100</b> U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	<b>100</b> U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 UJ	ug/L
Bromomethane	2	ug/L	2	ug/l	100 UJ	ug/L	120 U	ug/L	140 U	ug/L	<b>250</b> UJ	ug/L	170 U	ug/L	140 UJ	ug/L
Carbon Disulfide	56	ug/L	NA		100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	SW-2	MW-405E	3	MW-405	В	MW-405	В	MW-405	БВ	MW-405	В	MW-405	iВ
Sample Identifier					MW405B-07	703	MW405B-0	802	MW405B-0	900	MW405B-1	1003	MW405B-1	099	MW405B-1	1101
QC Type					Field Samp	ole	Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	ple	Field Sam	ıple
Date Collected					7/18/2003	3	8/21/200	)2	9/14/200	00	10/30/20	03	10/4/199	9	11/16/20	01
Chlorobenzene	39	ug/L	1000	ug/l	3400 J	ug/L	3500	ug/L	3400	ug/L	3400	ug/L	3400	ug/L	<b>3500</b> J	ug/L
Chloroethane	2800	ug/L	NA	-9.	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Chloroform	80	ug/L	400	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Chloromethane	6.7	ug/L	NA		100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	180	ug/L	180	ug/L	140 U	ug/L	200	ug/L	1700 100 J	ug/L	160 J	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	25 U	ug/L	120 U	ug/L	140 U	ug/L	25 U	ug/L	170 U	ug/L	140 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	100 U	ug/L	120 U	ug/L	<b>48</b> J	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
Styrene	890	ug/L	900	ug/l	100 UJ	ug/L	120 U	ug/L	140 U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Toluene	150	ug/L	6000	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	100 U	ug/L	120 U	ug/L	140 UJ	ug/L	<b>100</b> U	ug/L	170 U	ug/L	140 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	25 U	ug/L	120 U	ug/L	140 U	ug/L	<b>25</b> U	ug/L	170 U	ug/L	140 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	5400	ug/L	4900	ug/L	4300	ug/L	5300	ug/L	4500	ug/L	<b>4700</b> J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	100 U	ug/L	<b>120</b> U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L
Xylene (m,p)	2200	ug/L	NA		100 U	ug/L	120 U	ug/L	140 U	ug/L	<b>100</b> U	ug/L	-		140 U	ug/L
Xylene (o)	3300	ug/L	NA		100 U	ug/L	120 U	ug/L	140 U	ug/L	<b>100</b> U	ug/L	-		140 U	ug/L
Xylenes	2200	ug/L	6000	ug/l	100 U	ug/L	120 U	ug/L	140 U	ug/L	100 U	ug/L	170 U	ug/L	140 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA T	GC	MCP G	GW-2	MW-4A MW4A-03 Field Sam 3/12/199	98 ple	MW-4E MW4B-03 Field Sam 3/12/199	98 ple	MW-4B MW4B-07 Field Sam 7/17/200	703 iple	MW-4E MW4B-08 Field Sam 8/22/200	302 iple	MW-4B MW4B-10 Field Sam 10/29/200	03 ple	MW-503 MW503A-0 Field Sam 3/9/199	0398 nple
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	10.0 U	ug/L	10.0 U	ug/L	0.16 J	ug/L	10 U	ug/L	0.26 J	ug/L	10.0 UJ	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	10.0 U	ug/L	2.0 J	ug/L	0.56 J	ug/L	10 U	ug/L	0.87	ug/L	10.0 UJ	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	10.0 U	ug/L	10.0 U	ug/L	<b>0.26</b> UJ	ug/L	<b>10</b> U	ug/L	0.11 U	ug/L	10.0 UJ	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	10.0 U	ug/L	10.0 U	ug/L	0.26 J	ug/L	<b>10</b> U	ug/L	0.34	ug/L	10.0 UJ	ug/L
3-Nitroaniline	NA		NA		25.0 U	ug/L	26.0 U	ug/L	0.26 U	ug/L	<b>26</b> U	ug/L	0.28 U	ug/L	26.0 UJ	ug/L
4-Nitroaniline	NA		NA		25.0 U	ug/L	26.0 U	ug/L	0.26 U	ug/L	<b>26</b> U	ug/L	0.19 J	ug/L	26.0 UJ	ug/L
Aniline	NA		NA		25.0 U	ug/L	26.0 U	ug/L	<b>0.26</b> UJ	ug/L	<b>26</b> U	ug/L	0.14 J	ug/L	26.0 UJ	ug/L
Naphthalene	15	ug/L	6000	ug/l	10.0 U	ug/L	10.0 U	ug/L	0.26 U	ug/L	10 U	ug/L	0.28 U	ug/L	10.0 UJ	ug/L
Nitrobenzene	200	ug/L	NA		10.0 U	ug/L	2.0 J	ug/L	0.53	ug/L	10 U	ug/L	0.97	ug/L	10.0 UJ	ug/L
N-Nitroso-di-n-propylamine	NA		NA		10.0 U	ug/L	10.0 U	ug/L	-		-		_		10.0 UJ	ug/L
Pentachlorophenol	NA		NA		25.0 U	ug/L	26.0 U	ug/L	0.52 UJ	ug/L	<b>26</b> U	ug/L	0.28 U	ug/L	26.0 UJ	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		5.0 U	ug/L	30	ug/L	9.6	ug/L	11	ug/L	11	ug/L	2.9 J	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>10</b> U	ug/L	<b>10</b> U	ug/L	2.0 U	ug/L	<b>16</b> U	ug/L	2.0 U	ug/L	10 U	ug/L
2-Hexanone	NA		NA		<b>10</b> U	ug/L	<b>10</b> U	ug/L	2.0 U	ug/L	<b>16</b> U	ug/L	5.0 U	ug/L	10 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>10</b> U	ug/L	<b>10</b> U	ug/L	2.0 U	ug/L	<b>16</b> U	ug/L	2.0 U	ug/L	10 U	ug/L
Acetone	22000	ug/L	50000	ug/l	<b>10</b> U	ug/L	<b>10</b> U	ug/L	5. <b>0</b> U	ug/L	<b>16</b> U	ug/L	5.0 U	ug/L	10 U	ug/L
Benzene	5	ug/L	2000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Bromodichloromethane	2.1	ug/L	NA		5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Bromomethane	2	ug/L	2	ug/l	5.0 U	ug/L	5.0 U	ug/L	5.0 UJ	ug/L	<b>3.1</b> UJ	ug/L	5.0 UJ	ug/L	5.0 U	ug/L
Carbon Disulfide	56	ug/L	NA		5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	<b>3.1</b> U	ug/L	2.0 U	ug/L	5.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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# Appendix A Selected Historical Ground Water Data for Indoor Air Model Nyanza Superfund Site

Sample Location Name Sample Identifier QC Type Date Collected	ЕРА Т	GC	MCP G	6W-2	MW-4A MW4A-039 Field Samp 3/12/1998	ole	MW-4B MW4B-039 Field Samp 3/12/1998	ole	MW-4B MW4B-07 Field Sam 7/17/200	'03 iple	MW-4E MW4B-08 Field Sam 8/22/200	302 iple	MW-4B MW4B-10 Field Sam 10/29/200	ole	MW-50 MW503A- Field Sar 3/9/199	0398 mple
Chlorobenzene	39	ug/L	1000	ug/l	5.0 U	ug/L	5.4	ug/L	<b>1.3</b> J	ug/L	3.1 U	ug/L	1.7J	ug/L	5.0 U	ug/L
Chloroethane	2800	ug/L	NA		5.0 ∪	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 UJ	ug/L	5.0 U	ug/L
Chloroform	80	ug/L	400	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Chloromethane	6.7	ug/L	NA		5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 UJ	ug/L	5.0 U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	5.0 U	ug/L	30	ug/L	9.6	ug/L	10	ug/L	11	ug/L	2.9 J	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	5.0 U	ug/L	5.0 U	ug/L	0.50 U	ug/L	3.1 U	ug/L	0.50 U	ug/L	5.0 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Styrene	890	ug/L	900	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Toluene	150	ug/L	6000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	5.0 U	ug/L	5.0 U	ug/L	0.50 U	ug/L	3.1 U	ug/L	0.50 U	ug/L	5.0 U	ug/L
Trichloroethene	5	ug/L	300	ug/l	5.0 ∪	ug/L	160	ug/L	97	ug/L	84	ug/L	100	ug/L	<b>3.4</b> J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 UJ	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L
Xylene (m,p)	2200	ug/L	NA		-		-		2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		-		-		2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	5.0 U	ug/L	5.0 U	ug/L	2.0 U	ug/L	3.1 U	ug/L	2.0 U	ug/L	5.0 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier	EPA T	GC	MCP G	GW-2	MW-6A MW6A-03	98	MW-6A MW6A-10	003	MW-6E MW6B-03	398	MW-6E MW6B-04	401	MW-6E MW6B-04	02	MW-6E MW6B-04	499
QC Type					Field Sam	•	Field Sam		Field Sam	•	Field Sam	•	Field Sam	•	Field Sam	
Date Collected					3/12/199	18	10/30/20	03	3/16/199	98	4/20/200	01	4/24/200	2	4/27/199	99
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	44.0	ug/L	65	ug/L	23.0 J	ug/L	<b>26</b> J	ug/L	<b>40</b> J	ug/L	34.0 J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	170 J	ug/L	69	ug/L	600	ug/L	620	ug/L	<b>850</b> J	ug/L	1100	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	40.0 U	ug/L	3.2	ug/L	9.0 J	ug/L	9.3 J	ug/L	120 U	ug/L	<b>15.0</b> J	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>30.0</b> J	ug/L	16	ug/L	86.0	ug/L	<b>85</b> J	ug/L	<b>130</b> J	ug/L	150	ug/L
3-Nitroaniline	NA		NA		100 U	ug/L	1.3 U	ug/L	100 U	ug/L	26 U	ug/L	310 U	ug/L	110 U	ug/L
4-Nitroaniline	NA		NA		100 U	ug/L	1.3 U	ug/L	100 U	ug/L	26 U	ug/L	<b>310</b> UJ	ug/L	110 U	ug/L
Aniline	NA		NA		<b>420</b> J	ug/L	81	ug/L	82.0 J	ug/L	<b>13</b> J	ug/L	120 U	ug/L	<b>46.0</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	40.0 U	ug/L	0.84 J	ug/L	<b>22.0</b> J	ug/L	9.0 J	ug/L	120 U	ug/L	15.0 J	ug/L
Nitrobenzene	200	ug/L	NA		40.0 U	ug/L	1.3 U	ug/L	40.0 U	ug/L	10 U	ug/L	120 U	ug/L	43.0 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		40.0 U	ug/L	-		40.0 U	ug/L	-		-		-	
Pentachlorophenol	NA		NA		100 U	ug/L	1.3 U	ug/L	<b>100</b> U	ug/L	26 U	ug/L	2.2	ug/L	110 U	ug/L
Volatile Organics							'						'			
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	<b>14</b> U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	15 U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		520	ug/L	240	ug/L	160	ug/L	150	ug/L	140	ug/L	200	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	15 U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	<b>28</b> U	ug/L	4.0 U	ug/L	<b>27</b> U	ug/L	<b>69</b> U	ug/L	<b>110</b> UJ	ug/L	74 U	ug/L
2-Hexanone	NA		NA		<b>28</b> U	ug/L	4.0 U	ug/L	<b>27</b> U	ug/L	<b>69</b> U	ug/L	<b>110</b> UJ	ug/L	74 U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		<b>28</b> U	ug/L	4.0 U	ug/L	<b>27</b> U	ug/L	<b>69</b> U	ug/L	110 U	ug/L	74 U	ug/L
Acetone	22000	ug/L	50000	ug/l	<b>28</b> U	ug/L	4.0 U	ug/L	<b>27</b> U	ug/L	<b>69</b> U	ug/L	110 U	ug/L	74 U	ug/L
Benzene	5	ug/L	2000	ug/l	14 U	ug/L	4.0 U	ug/L	98	ug/L	81	ug/L	44	ug/L	55	ug/L
Bromodichloromethane	2.1	ug/L	NA		14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	<b>15</b> U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	<b>15</b> U	ug/L
Bromomethane	2	ug/L	2	ug/l	14 U	ug/L	<b>10</b> UJ	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	<b>15</b> UJ	ug/L
Carbon Disulfide	56	ug/L	NA		14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	<b>15</b> U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	14 U	ug/L	4.0 U	ug/L	13 U	ug/L	14 U	ug/L	22 U	ug/L	15 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

Shaded values indicate exceedence of the lowest criteria used for screening

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 $<sup>\</sup>mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name	EPA T	GC	MCP G	W-2	MW-6A		MW-6A		MW-6E		MW-6E		MW-6E		MW-6E	_
Sample Identifier					MW6A-03		MW6A-10		MW6B-03		MW6B-04		MW6B-04		MW6B-04	
QC Type					Field Sam		Field Sam	•	Field Sam	•	Field Sam	•	Field Sam	•	Field Sam	•
Date Collected					3/12/199	8	10/30/200	03	3/16/199	98	4/20/200	)1	4/24/200	)2	4/27/199	99
Chlorobenzene	39	ug/L	1000	ug/l	280	ug/L	110	ug/L	500	ug/L	440	ug/L	420	ug/L	560	ug/L
Chloroethane	2800	ug/L	NA		14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Chloromethane	6.7	ug/L	NA		14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/l	22 U	ug/L	<b>15</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	510	ug/L	230	ug/L	160	ug/L	150	ug/L	130	ug/L	210	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	14 U	ug/L	1.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	<b>15</b> U	ug/L
Dibromochloromethane	3.2	ug/L	NA		14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	22 U	ug/L	15 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	<b>2.1</b> J	ug/L	4.0 U	ug/L	6.8 J	ug/L	6.3 J	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	14 U	ug/L	4.0 U	ug/L	<b>3.2</b> J	ug/L	14 U	ug/L	<b>22</b> U	ug/L	8.3 J	ug/L
Styrene	890	ug/L	900	ug/l	14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	14 U	ug/L	4.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	14 U	ug/L	4.0 U	ug/L	<b>2.4</b> J	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	<b>7.4</b> J	ug/L	8.6	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	14 U	ug/L	1.0 U	ug/L	<b>13</b> U	ug/L	14 U	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	90	ug/L	37	ug/L	470	ug/L	370	ug/L	320	ug/L	<b>580</b> J	ug/L
Vinyl chloride	2	ug/L	2	ug/l	14 U	ug/L	4.0 U	ug/L	<b>3.5</b> J	ug/L	14 U	ug/l	22 U	ug/L	15 U	ug/L
Xylene (m,p)	2200	ug/L	NA		-		4.0 U	ug/L	-		14 U	ug/L	22 U	ug/L	-	
Xylene (o)	3300	ug/L	NA		-		4.0 U	ug/L	-		3.8 J	ug/L	22 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	14 U	ug/L	4.0 U	ug/L	6.0 J	ug/L	3.8 J	ug/L	<b>22</b> U	ug/L	<b>15</b> U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier	EPA T	GC	MCP G	W-2	MW-6B MW6B-06		MW-6B MW6B-07		MW-6E MW6B-08		MW-6B MW6B-09		MW-6E MW6B-10		MW-68 MW6B-10	
QC Type					Field Sam		Field Sam		Field Sam		Field Sam		Field Sam		Field San	
Date Collected					6/20/200		7/17/200	•	8/21/200	•	9/15/200	•	10/30/20	•	10/5/19	•
Date Collected					0,20,200		7717230	·	3/21/200	<i>,</i> _	3/13/233		10/00/20		16/6/16	
Semivolatile Organics																
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	<b>33</b> J	ug/L	<b>14</b> J	ug/L	<b>32</b> J	ug/L	24	ug/L	24	ug/L	32.0 J	ug/L
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	1000	ug/L	<b>720</b> J	ug/L	700	ug/L	680	ug/L	650	ug/L	<b>820</b> J	ug/L
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	12	ug/L	4.8 J	ug/L	<b>12</b> J	ug/L	10 J	ug/L	8.1 J	ug/L	16.0	ug/L
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	140	ug/L	<b>52</b> J	ug/L	110	ug/L	110 J	ug/L	89	ug/L	150 J	ug/L
3-Nitroaniline	NA		NA		26 U	ug/L	2.6 U	ug/L	260 U	ug/L	27 U	ug/L	14 U	ug/L	26.0 U	ug/L
4-Nitroaniline	NA		NA		26 U	ug/L	2.6 U	ug/L	<b>260</b> U	ug/L	<b>27</b> U	ug/L	14 U	ug/L	26.0 U	ug/L
Aniline	NA		NA		<b>22</b> J	ug/L	7.1 J	ug/L	<b>19</b> J	ug/L	13 J	ug/L	8.7 U	ug/L	<b>51.0</b> J	ug/L
Naphthalene	15	ug/L	6000	ug/l	9.2 J	ug/L	2.6 U	ug/L	100 U	ug/L	2.4 J	ug/L	14 U	ug/L	7.1 J	ug/L
Nitrobenzene	200	ug/L	NA		9.2 J	ug/L	2.6 U	ug/L	100 U	ug/L	4.6 J	ug/L	14 U	ug/L	10.0 U	ug/L
N-Nitroso-di-n-propylamine	NA		NA		_		_		_		_		-		-	
Pentachlorophenol	NA		NA		26 U	ug/L	1.2 J	ug/L	<b>260</b> U	ug/L	1.5 J	ug/L	14 UJ	ug/L	1.5 J	ug/L
Volatile Organics																
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	10 U	ug/L	11 U	ug/L
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
1,1-Dichloroethane	220	ug/L	9000	ug/l	14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> UJ	ug/L	<b>10</b> U	ug/L	11 U	ug/L
1,1-Dichloroethene	19	ug/L	1	ug/l	14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
1,2-Dichloroethane	5	ug/L	20	ug/l	14 U	ug/L	<b>20</b> U	ug/L	13 U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
1,2-Dichloroethene (total)	180	ug/L	NA		150	ug/L	220	ug/L	230	ug/L	140	ug/L	190	ug/L	130	ug/L
1,2-Dichloropropane	3.5	ug/L	9	ug/l	14 U	ug/L	<b>20</b> U	ug/L	13 U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
2-Butanone	44000	ug/L	50000	ug/l	71 U	ug/L	<b>20</b> U	ug/L	<b>64</b> U	ug/L	<b>180</b> U	ug/L	<b>10</b> U	ug/L	<b>55</b> U	ug/L
2-Hexanone	NA		NA		71 U	ug/L	<b>20</b> U	ug/L	<b>64</b> U	ug/L	<b>180</b> U	ug/L	<b>10</b> U	ug/L	<b>55</b> U	ug/L
4-Methyl-2-pentanone	1400	ug/L	NA		71 U	ug/L	<b>20</b> U	ug/L	<b>64</b> U	ug/L	<b>180</b> U	ug/L	<b>10</b> U	ug/L	<b>55</b> U	ug/L
Acetone	22000	ug/L	50000	ug/l	71 U	ug/L	14 U	ug/L	<b>64</b> U	ug/L	<b>180</b> U	ug/L	<b>10</b> U	ug/L	<b>55</b> U	ug/L
Benzene	5	ug/L	2000	ug/l	48	ug/L	80	ug/L	120	ug/L	55	ug/L	58	ug/L	51	ug/L
Bromodichloromethane	2.1	ug/L	NA		14 U	ug/L	20 U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	10 U	ug/L	11 U	ug/L
Bromoform	0.0083	ug/L	800	ug/l	14 UJ	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> UJ	ug/L	10 U	ug/L	11 U	ug/L
Bromomethane	2	ug/L	2	ug/l	14 U	ug/L	<b>20</b> UJ	ug/L	<b>13</b> U	ug/L	37 U	ug/L	<b>25</b> UJ	ug/L	11 U	ug/L
Carbon Disulfide	56	ug/L	NA		14 U	ug/L	20 U	ug/L	<b>13</b> U	ug/L	37 U	ug/L	10 U	ug/L	11 U	ug/L
Carbon Tetrachloride	5	ug/L	20	ug/l	14 U	ug/L	20 U	ug/L	13 U	ug/L	37 U	ug/L	10 U	ug/L	11 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10<sup>6</sup> cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2

 $\mbox{U = Not Detected} \quad \mbox{J = Estimated} \quad \mbox{R = Rejected} \quad \mbox{NA = Not Available - = Not Analyzed}$ 

Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name		GC	MCP G	6W-2	MW-6B		MW-6B		MW-6E		MW-6E		MW-6E		MW-6E	
Sample Identifier					MW6B-06		MW6B-07		MW6B-08		MW6B-09		MW6B-10		MW6B-10	
QC Type					Field Sam		Field Sam		Field Sam	•	Field Sam	•	Field Sam	•	Field Sam	•
Date Collected					6/20/200	0	7/17/200	3	8/21/200	02	9/15/200	0	10/30/20	03	10/5/199	99
Chlorobenzene	39	ug/L	1000	ug/l	<b>440</b> J	ug/L	<b>400</b> J	ug/L	440	ug/L	460	ug/L	400	ug/L	410	ug/L
Chloroethane	2800	ug/L	NA		<b>14</b> U	ug/L	20 U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
Chloroform	80	ug/L	400	ug/l	<b>14</b> U	ug/L	20 U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
Chloromethane	6.7	ug/L	NA		<b>14</b> U	ug/L	20 U	ug/L	13 U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	140	ug/L	220	ug/L	220	ug/L	140	ug/L	190	ug/L	130	ug/L
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	<b>14</b> U	ug/L	5.0 U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	2.5 U	ug/L	11 U	ug/L
Dibromochloromethane	3.2	ug/L	NA		<b>14</b> U	ug/L	20 U	ug/L	13 U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	11 U	ug/L
Ethylbenzene	700	ug/L	30000	ug/l	3.7 J	ug/L	<b>20</b> U	ug/L	8.5 J	ug/L	<b>37</b> U	ug/L	<b>6.5</b> J	ug/L	11 U	ug/L
Methylene chloride	58	ug/L	50000	ug/l	<b>14</b> U	ug/L	<b>12</b> UJ	ug/L	<b>13</b> U	ug/L	<b>15</b> J	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
Styrene	890	ug/L	900	ug/l	<b>14</b> U	ug/L	<b>20</b> UJ	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
Tetrachloroethene	5	ug/L	3000	ug/l	<b>14</b> U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
Toluene	150	ug/L	6000	ug/l	<b>14</b> U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	<b>14</b> U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> UJ	ug/L	<b>10</b> U	ug/L	<b>11</b> U	ug/L
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	<b>14</b> U	ug/L	5.0 U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	2.5 U	ug/L	<b>11</b> U	ug/L
Trichloroethene	5	ug/L	300	ug/l	390	ug/L	220	ug/L	280	ug/L	410	ug/L	300	ug/L	370	ug/L
Vinyl chloride	2	ug/L	2	ug/l	<b>14</b> U	ug/L	20 U	ug/L	13 U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	11 U	ug/L
Xylene (m,p)	2200	ug/L	NA		<b>14</b> U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	<b>37</b> U	ug/L	<b>10</b> U	ug/L	-	
Xylene (o)	3300	ug/L	NA		14 U	ug/L	<b>20</b> U	ug/L	<b>13</b> U	ug/L	37 U	ug/L	10 U	ug/L	-	
Xylenes	2200	ug/L	6000	ug/l	<b>14</b> U	ug/L	20 U	ug/L	13 U	ug/L	<b>37</b> U	ug/l	<b>10</b> U	ug/L	11 U	ug/L

EPA TGC = EPA Target Ground Water Concentration (10^6 cancer risk or noncancer hazard quotient of 0.1 or EPA MCL) MCP GW-2 = Massachusetts Contingency Plan Ground Water-2 U = Not Detected J = Estimated R = Rejected NA = Not Available - = Not Analyzed Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

**Nyanza Superfund Site** 

Sample Location Name Sample Identifier QC Type Date Collected	EPA TGC MCP GW-2		MW-6B MW6B-1101 Field Sample 11/15/2001		MW-9A MW9A-0398 Field Sample 3/16/1998							
Semivolatile Organics												
1,2,4-Trichlorobenzene	340	ug/L	10000	ug/l	32	ug/L	2.0 J	ug/L	-	-	-	-
1,2-Dichlorobenzene	260	ug/L	10000	ug/l	940	ug/L	20.0	ug/L	-	-	-	-
1,3-Dichlorobenzene	83	ug/L	10000	ug/l	13	ug/L	10.0 U	ug/L	-	-	-	-
1,4-Dichlorobenzene	820	ug/L	30000	ug/l	<b>120</b> J	ug/L	3.0 J	ug/L	-	-	_	-
3-Nitroaniline	NA		NA		<b>26</b> U	ug/L	25.0 U	ug/L	-	-	-	-
4-Nitroaniline	NA		NA		<b>26</b> U	ug/L	25.0 U	ug/L	-	-	-	-
Aniline	NA		NA		<b>7.1</b> J	ug/L	2.0 J	ug/L	-	-	-	-
Naphthalene	15	ug/L	6000	ug/l	1.4 J	ug/L	10.0 U	ug/L	-	-	-	-
Nitrobenzene	200	ug/L	NA		<b>10</b> U	ug/L	10.0 U	ug/L	-	-	-	-
N-Nitroso-di-n-propylamine	NA		NA		-		10.0 U	ug/L	-	-	-	-
Pentachlorophenol	NA		NA		2.0	ug/L	25.0 U	ug/L	-	-	-	-
Volatile Organics												
1,1,1-Trichloroethane	310	ug/L	4000	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,1,2,2-Tetrachloroethane	3	ug/L	20	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,1,2-Trichloroethane	5	ug/L	20000	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,1-Dichloroethane	220	ug/L	9000	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,1-Dichloroethene	19	ug/L	1	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,2-Dichloroethane	5	ug/L	20	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
1,2-Dichloroethene (total)	180	ug/L	NA		160	ug/L	33	ug/L	-	-	-	-
1,2-Dichloropropane	3.5	ug/L	9	ug/l	<b>11</b> U	ug/L	5.0 U	ug/L	-	-	-	-
2-Butanone	44000	ug/L	50000	ug/l	<b>55</b> U	ug/L	10 U	ug/L	-	-	-	-
2-Hexanone	NA		NA		<b>55</b> U	ug/L	10 U	ug/L	-	-	-	-
4-Methyl-2-pentanone	1400	ug/L	NA		<b>55</b> U	ug/L	10 U	ug/L	-	-	-	-
Acetone	22000	ug/L	50000	ug/l	55 U	ug/L	<b>10</b> U	ug/L	-	-	-	-
Benzene	5	ug/L	2000	ug/l	73	ug/L	5.0 U	ug/L	-	-	-	-
Bromodichloromethane	2.1	ug/L	NA		11 U	ug/L	5.0 U	ug/L	-	-	-	-
Bromoform	0.0083	ug/L	800	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Bromomethane	2	ug/L	2	ug/l	11 UJ	ug/L	5.0 U	ug/L	-	-	-	-
Carbon Disulfide	56	ug/L	NA		11 U	ug/L	5.0 U	ug/L	-	-	-	-
Carbon Tetrachloride	5	ug/L	20	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-

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Shaded values indicate exceedence of the lowest criteria used for screening

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#### **Selected Historical Ground Water Data for Indoor Air Model**

Nyanza Superfund Site

Sample Location Name	EPA TGC		MCP GW-2		MW-6B		MW-9A					
Sample Identifier	Sample Identifier				MW6B-1101		MW9A-0398					
QC Type				Field Sample		Field Sample						
Date Collected					11/15/2001		3/16/1998					
Chlorobenzene	39	ug/L	1000	ug/l	470	ug/L	11	ug/L	-	-	-	-
Chloroethane	2800	ug/L	NA		11 U	ug/L	5.0 U	ug/L	-	-	-	-
Chloroform	80	ug/L	400	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Chloromethane	6.7	ug/L	NA		11 U	ug/L	5.0 U	ug/L	-	-	-	-
cis-1,2-Dichloroethene	21	ug/L	30000	ug/l	150	ug/L	33	ug/L	-	-	-	-
cis-1,3-Dichloropropene	0.84	ug/L	5	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Dibromochloromethane	3.2	ug/L	NA		11 U	ug/L	5.0 U	ug/L	-	-	-	-
Ethylbenzene	700	ug/L	30000	ug/l	4.6 J	ug/L	5.0 U	ug/L	-	-	-	-
Methylene chloride	58	ug/L	50000	ug/l	2.2 J	ug/L	5.0 U	ug/L	-	-	-	-
Styrene	890	ug/L	900	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Tetrachloroethene	5	ug/L	3000	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Toluene	150	ug/L	6000	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
trans-1,2-Dichloroethene	18	ug/L	20000	ug/l	2.3 J	ug/L	5.0 U	ug/L	-	-	-	-
trans-1,3-Dichloropropene	0.84	ug/L	5	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Trichloroethene	5	ug/L	300	ug/l	420	ug/L	4.5 J	ug/L	-	-	-	-
Vinyl chloride	2	ug/L	2	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-
Xylene (m,p)	2200	ug/L	NA		11 U	ug/L	-		-	-	-	-
Xylene (o)	3300	ug/L	NA		11 U	ug/L	-		-	-	-	-
Xylenes	2200	ug/L	6000	ug/l	11 U	ug/L	5.0 U	ug/L	-	-	-	-

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